STAMHUIS KITTY WANDA

REVISION OF THE GENUS *LYCUS* F. (COLEOPTERA: LYCIDAE) OF THE SOUTHERN AFRICAN SUBREGION

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REVISION OF THE GENUS *LYCUS* F. (COLEOPTERA: LYCIDAE) OF THE SOUTHERN AFRICAN SUBREGION

by

Kitty Wanda Stamhuis

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CONTENTS

ABSTRACT

The revision of the genus *Lycus* F. from the southern African subregion resulted in the recognition of 31 valid species. Twelve species are synonymized, 9 are placed *incertae sedis* and 4 lectotypes are designated.

The current seven Afrotropical subgenera are discussed and species groups are proposed, which can only be defined after a complete study on the whole genus is undertaken. Species characters are discussed and a key to all species, historical background, redescriptions, and diagnoses are given. The external genitalia and adults of most male species are illustrated. Distribution maps based on locality information recorded from the labels of more or less 5000 specimens examined from 13 institutions, are presented.

A complete external morphological study with special reference to the mouthparts and feeding mechanism was done and is reported on here. A chapter on the biology of this widely mimicked species with their aposematic colouration is added.

This revision serves as a basis for future studies, highlighting the useful species characters and problems that might occur as a result of all the variation existing in elytral colour and form.

SAMEVATTING

Die hersiening van die genus *Lycus* F. van die suider-Afrikaanse substreek het gelei tot die erkening van 31 geldige spesies. Twaalf spesies is gesinonimiseer, 9 is *incertae sedis* geplaas en 4 lektotipes is aangewys.

Die huidige stand van sewe Afrotropiese subgenera word bespreek en spesiesgroepe, wat alleenlik gedefinieer kan word nadat die hele genus hersien is, word voorgestel. Spesieskenmerke word bespreek en 'n sleutel tot al die spesies, historiese agtergrond, herbeskrywings, en diagnoses word gegee. Die uitwendige genitalieë en die volwassenes van die meeste spesies (mannetjies) word geïllustreer. Verspreidingskaarte en lokaliteitsinligting, verkry van etikette van min of meer 5000 eksemplare afkomstig van 13 instansies, word gegee.

'n Volledige uitwendige morfologiese studie, met spesiale verwysing na die monddele en voedingsmeganisme is gedoen, en word hier bespreek. 'n Hoofstuk oor die biologie van die algemeen bekende nagebootste spesies met hul aposematiese kleuring is bygevoeg.

Hierdie hersiening dien as 'n basis vir verdere studie. Die bruikbare kenmerke en probleme wat kan onstaan as gevolg van die bestaande variasie in elytrakleur en -vorm, word uitgelig.

CHAPTER I INTRODUCTION

The family Lycidae was previously divided into two subfamilies Homalisinae and Lycinae, the latter composed of 15 tribes (Kleine 1933). In the most recent revision of the supergeneric classification of the family (based on the comparative morphology of the adult male and female genitalia, and mouthparts (Bocák & Bocáková 1990)), six subfamilies were proposed (Lycinae, Leptolycinae, Ateliinae, Metriorrhynchinae, Erotinae and Calochrominae). The Lycinae as presently constituted, comprises three tribes (Calopterini, Lycini and Macrolycini). The tribe Lycini contains six genera, *Lycus* F., *Celias* Castelnau, *Lycostomus* Motschulsky, *Demosis* Waterhouse, *Lipernes* Waterhouse, and *Thonalmus* Bourgeois. Only *Lycus* and *Demosis* have representatives in Africa.

Lycus is the largest genus in the family (with about 300 described species in Africa), occurring mainly in the tropical and subtropical regions of Africa (Fig. 1). In Africa most species and specimens have been collected in Zaire, where the greatest variation in form and colour is highlighted. *Lycus* species are floricolous and feeding is aided by the prolongation of the head and associated "hairy" mouthparts. They are also mimicked by many other insect groups by displaying the conspicuous orange and black aposematic colouration of unpalatable insects.

The first *Lycus* species, *latissimus* and *rostratus* were described by Linnaeus (1767) in his *Systema Naturae*, under the genus *Lampyris* (Lampyridae). Fabricius (1775) described a third species *palliatus* (*Pyrochroa*) and in 1781 *proboscideus* and *ferraticornis* under the genus *Pyrochroa* (Pyrochroidae). In 1787, Fabricius defined the genus *Lycus*, and included the five species named above. Bourgeois (1883a) divided *Lycus* (which then comprised 55 species), into 10 subgenera viz.: *Acantholycus*, *Hololycus*, *Lopholycus*, *Lycus*, *Chlamydolycus*, *Haplolycus*, *Merolycus*, *Neolycus*, *Thoracocalon* and *Lycostomus*, of which only the first seven have representatives in Africa. These subgenera were mainly formed on the basis of elytral characters (with the exception of *Merolycus*) but have become invalidated because of the vast amount of variation in the species described to date.

Since Kleine (1933/ Junk and Schenkling's Coleopterorum Catalogus) in which he recorded 120 species from Africa, an additional 165 species have been recorded in Africa. Thirty-one species occur in the southern African region (south of the 17th latitude). According to Gomes-Alves (1959, 1962 and 1978) 33 species occur in Mozambique and Angola. The major (well illustrated) work by Kleine (1937) on the lycids of the Congo (Zaire), was used as a reference basis for the present study.

The majority of species descriptions before 1933 were not accompanied by illustrations. Descriptions of many species, by earlier authors e.g. Linnaeus, Fabricius, Fåhraeus, Bourgeois, Pic, Guérin-Méneville and others, were based mostly on colour and form of the elytra which are very variable characters. Some species descriptions were based on female specimens (elytral characters), which are of little taxonomical value because of the overall similarity of most female specimens. Females are difficult and sometimes even impossible to identify if not caught in copulation. This resulted in numerous species names, of which I consider about one-third (of the African species) to be synonyms. The task of identifying the number of southern African species existing today (without the aid of type specimens), was made difficult or sometimes impossible. The large amount of incorrectly determined material in collections is a clear indication of this problem (type material and original descriptions rarely consulted by earlier workers).

Not all the type material could be traced. Most African material was deposited in various European museums, depending on the nationality of the earlier authors (Kleine's special collection of Lycidae was destroyed during the war (Winkler 1952)). Usually no mention was made of type designations and where the designated types were housed. Many "Type", "Syntype" or "Cotype" specimens are now in circulation, some of which are valid holotypes or had to be designated as lectotypes and paralectotypes, while others have no type status and are incorrectly labelled.

This study concerns a revision of the genus *Lycus* of the southern African region, which will serve as a foundation for further studies of African species. The genus is redefined and discussed, as are the subgenera. Because of clinal variation in some species, the study of species of separate geographical regions could lead to synonymies going unnoticed. To avoid this problem, series of specimens across their geographical range were studied. This problem was exacerbated by many earlier authors like Bourgeois, Pic etc., who did not take regional variation into account, resulting in the many species names. Because of the unsatisfactory state of the taxonomy of *Lycus* and since large collections of species are available locally and in the major European museums, it seemed worthwhile to undertake a detailed study.

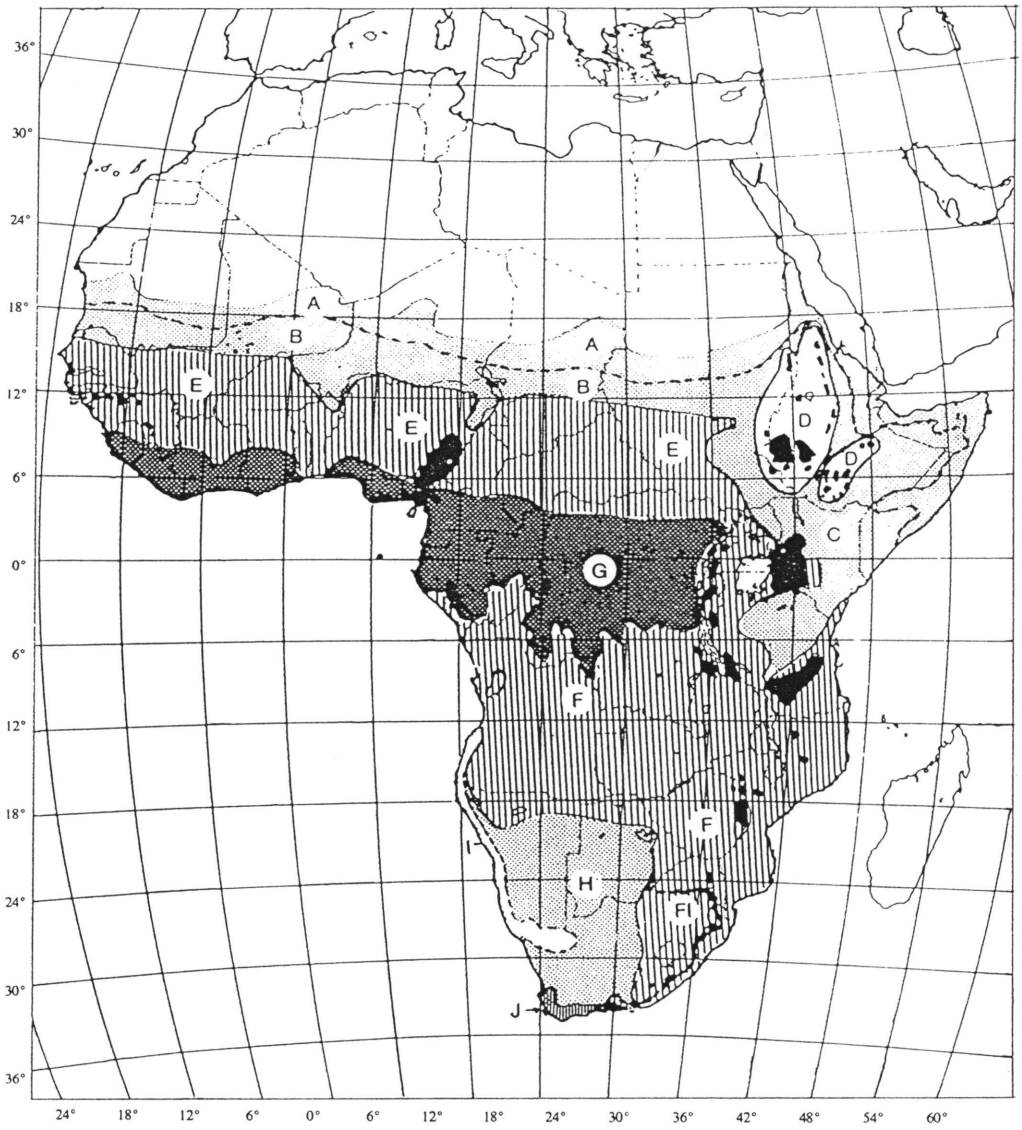
The main purpose of this study was to be able to identify and to differentiate between the southern African species of the genus *Lycus*. Because of the large variation that occurs in both elytral form and colour, biological and morphological information is of great value in species designation, especially in taxonomical studies on this genus. Descriptions are not only based on diagnostic characters (because of the limited number of species occurring in the southern African region), as this might be insufficient when a revision of the whole genus is done. There is no definite set of characters that comply to the heading diagnostic characters, as there are many overlapping characters *i.e.* each species has its own

diagnostic characters when compared to distantly related species, which differ and may be less when compared to similar species (or closely related species). The external male genitalia are not considered to be the most diagnostic characters, as many good species have very similar aedeagi. Associated descriptions of elytral variation, pronotal form, rostration of the head and appendages, the form of the penultimate and ultimate male abdominal segments and a knowledge of geographical distributions are necessary for a positive identification.

The male of each species is redescribed and compared to the one to which it is most similar (in the southern African region). A key based on external characters, a bibliographic history of each species, notes on the type specimens and a detailed treatment of the geographic distribution of each species is included. A number of illustrations were necessary to display the elytral variation and forms that exist, as well as the form of the external male genitalia.

Consequently, by studying the southern African species, it was possible to get an idea of taxonomically important characters (for species identification), though no final conclusion could be drawn without taking into account all the regional variation that occurs in each species. The result is lengthy descriptions containing taxonomically useful information about the variation, to the extent that the species in question can be identified and compared. This will also make it easier to detect synonyms as far as possible and to aid in future studies on the genus.

It soon became apparent from examination of the large amount of material available, that a review of all the Afrotropical lycids would be advisable to explain all the regional variation. The final ranking *i.e.* subgeneric and further synonymy would only be possible with a revision of the Afrotropical species. Approximately 5000 specimens from 13 institutions were examined.



The main biotic zones of Africa south of the Sahara

ZONES

A Sahelian
B Sudan
C Somali Arid
D Ethiopian Highlands
E Northern Savanna Woodland
F Southern Savanna Woodland
Fl Southern Savanna Grassland
G Forest
H South West Arid
I Namib Desert
J Cape Macchia or *fynbos*

Arid zone

Savanna zone

Cape Macchia or *fynbos*

Isolated areas of montane or evergreen forest

Forest zone

Desert

Figure 1: A map of the main biotic zones of Africa (after Smithers 1986) - the genus *Lycus* F. has a tropical and subtropical distribution, excluding the Desert Zone.

CHAPTER II MATERIALS AND METHODS

Before commencing a taxonomic revision a thorough knowledge of the morphology, biology (as far as possible) and the distribution of the taxa concerned is necessary.

2.1 MORPHOLOGY

A study on the morphology of the head was undertaken because the rostrum seemed to be a very interesting character, not only taxonomically but also from a biological and morphological point of view. In the usually, heavily sclerotized and rigid cranium of Coleoptera, facial sutures tend to be reduced or lost (DuPorte, 1960), often making it difficult, if not impossible, to interpret the external morphological structures. In *Lycus* the rostration of the head seems to be closely related to feeding habits. The internal anatomy, including the nervous system facilitated the interpretation of the external morphology.

The heads from live male and female specimens of various *Lycus* species, collected in the Pretoria (25.40S 28.08E) and Brits (25.45S 27.56E) districts, were fixed, dehydrated, embedded in paraffin wax and sectioned according to the method of Slifer & King (1933), as modified by De Villiers (1969). The unstained sections were studied under phase contrast microscopy and serial sketches were made of the cross sections to obtain a total interior image of the head with its feeding canal, associated muscles and nervous system.

Whole mounts of heads and mouthparts were also made so that the head could be studied externally. Heads were placed in cold 10% KOH solution for 3-4 days to dissolve the internal tissues, after which they were rinsed with distilled water to which a few drops of acetic acid has been added. Dehydration in alcohol (70%-100%), acid-füchsin was added to the 95% alcohol for staining, which was followed by clearing in xylene and mounting in "Entellan" on microscope slides. Drawings were made with the aid of a dissecting microscope and a drawing tube.

2.2 TAXONOMY

To get insight into this group a thorough knowledge of all previously published work was necessary. Firstly Junk and Schenkling's Coleopterorum Catalogus was used (Kleine 1933), after which the Zoological Record and Horn & Schenkling (1928) were consulted. The literature records revealed that about 300 Afrotropical *Lycus* species had been described, with 31 species recorded from the southern African subregion. Copies of all original descriptions were obtained.

This subregion was chosen because of its general accessibility for collecting, and because of the availability of large collections housed in local museums. Males and females could be collected in copulation thereby confirming the species status of the females (the females of different species are very similar). A greater knowledge of the importance of certain characters (e.g. the antennae, pronotal form and elytral colour and form) was also acquired.

More than 5000 specimens were individually examined and supplied with determination labels. All descriptions were based on study with a Zeiss SV8 stereo microscope and all line drawings were made by using a drawing tube.

Measurements of body length were taken from the anterior margin of the pronotum to the tip of the elytra. All body lengths are given in millimetres. According to Green (1949), the ratio between the length of the beak (measured from the anterior margin of the eyes to the apex of the clypeus), and the distance between the eyes (taken at the midpoint of their length), provides a convenient means of comparison of the rostral structure of different species. The external male genitalia were extracted after submerging specimens in boiling water for a few minutes to soften them. The aedeagus was removed with the aid of a fine point forceps. The male genitalia were affixed to cards and pinned directly beneath the specimens.

Types and museum material were studied as were newly collected specimens. Data from the holo- and paratype labels were quoted in full. Lectotypes and paralectotypes were designated in all cases where only "syntype", "cotype" or "type" series of a species existed. If type specimens could not be located, use was made of determined material, original and other descriptions accompanied by illustrations. When original descriptions were not accompanied by illustrations, and no type material or determined material could be located, these species were regarded as "*incertae sedis*."

In descriptions and redescriptions of the genus and species, unnecessary repetition of consistent morphological characters was avoided, the degrees of variation are also discussed and regional variation is noted were series were obtainable.

Under the heading geographical distribution localities are recorded in alphabetical order, closed symbols [•] represent localities from the material examined. The geographical range of species whose distribution extends beyond the limits of the southern African subregion are illustrated on sub-saharan maps by the symbol ◬ as well as areas within limits without specific localities.

Material for this study was borrowed from the following institutions:

BMNH - British Museum (The Natural History Museum), London.
BMSA - National Museum, Bloemfontein.
ISNB - Institut Royal des Sciences Naturelle de Belgique, Bruxelles.
MNHN - Museum National d 'Histoire Naturelle, Paris.
MRAC - Musée Royal de l'Afrique Centrale, Tervuren.
NHRS - Naturhistoriska Riksmusset, Stockholm.
SAMC - South African Museum, Cape Town.
SANC - South African National Collection of Insects, Pretoria.
SMWH - State Museum, Windhoek.
TMSA - Transvaal Museum, Pretoria.
UPSA - University of Pretoria, Pretoria.
ZMHB - Museum für Naturkunde der Humboldt Universität, Berlin.
ZMPA - Polish Academy of Science, Warszawa.

CHAPTER III BIOLOGY

Information on the biology of the members of this genus is very scarce, even though according to Lawrence (1982), this is a large family (consisting of 150 genera and about 3500 species), and evident in the tropical and subtropical regions of the world.

An interesting characteristic of the adults of some genera is the rostrate head, for example, *Lycus*, *Lygistopterus* Dejean, *Lucaina* Dugès and *Lycostomus* Motschulsky (Bradley 1930, Arnett 1968). The rostration of the head seems to be closely related to feeding habits. A controversy exists, however, about the feeding habits of the rostrate and non-rostrate forms. According to Lefroy (1923), Bradley (1930), Comstock (1930) and Arnett (1968), all members of the family Lycidae are predators on other insects. Linsley *et al.* (1961), Eisner *et al.* (1962), on the other hand, reported that the genus *Lycus* feeds on nectar of *Melilotus alba* (sweet clover) (Asteraceae). Crowson (1981) stated that some of the rostrate coleopterous forms, such as the Lycidae "are floricolous, so that the rostrum may aid them to reach more deep-seated nectaries". Forster (1988, 1989) observed *Metriorrhynchus* Guérin-Méneville (which is a rostrate species) feeding on nectar in flowers of Orchidaceae and Asclepiadaceae. By examination of the beetles he found pollinaria attached to the mouthparts, antennae and front legs, and concluded that this species is capable of cross-pollination.

During the course of this study adult *Lycus* specimens were observed feeding on the nectar of small, white flowers, such as *Heteropyxis natalensis* (Lavender tree) (Myrtaceae), and *Ziziphus mucronata* (Buffalo thorn) (Rhamnaceae). It is concluded that the rostration of the head appears to be correlated with nectar feeding, while the non-rostration of the head (occurring in most of the genera) is associated with predation, and that nectar feeding (rostrate) forms may be derived from carnivorous (non-rostrate) forms (Stamhuis & De Villiers [unpublished]).

According to Gomes-Alves (1978) some of the host plants of *Lycus* species in Angola are: *Coffea robusta*, *C. arabica*, *Sacharum officinarum*, *Helianthus anuus*, *Persea gratissima*, *Citrus* sp., *C. nobilis*, *C. aurantium*, *Allium cepa*, *Triticum*, *Ipomoea batatas*, *Prunus persica*, *Pterys* sp., *Pandiaka welwitschii*, *Pyrus malus*, *Ochna* sp., *Phaseolus vulgaris*, *Gossypium* sp., *Elais guineensis*, *Zea mays*, *Pennisetum purpureum*, *Cupressus lusitania*.

Adults possess aposematic colouration and are highly unpalatable insects, especially to birds (Richards and Davies 1977). Winkler (1964) noted that these beetles are in need of warning colouration because

their movements are extremely slow and irregular, but the contrary is most likely *i.e.* there is no need to move fast when chemically protected. According to Daly *et al.* (1981) the lycid hemolymph contains a chemical irritant, cantharidin, which probably causes the unpalatability. Many cases of Batesian and Mullerian mimicry are known, in which beetle families such as belids, buprestids, cantharids, cerambycids, cetoniids (subfamily), chrysomelids, clerids, lampyrids, meloids, oedemerids, pythids, stathomopodids as well as a few moths (arctiids, ctenuchids, geometrids, pyromorphids, and lithosiids) and wasps (ichneumonids, braconids and mutilids), simulate the appearance of lycids surprisingly closely. Many mimic not only colour patterns, but also their general shape and conspicuously thick antennae (Linsley *et al.* 1961). According to Moore and Brown (1989), mimics of *Metriorrhynchus* (Lycidae), appear as a mimetic spectrum covering virtually the entire range between the Batesian and Mullerian extremes.

According to Linsley *et al.* (1961), *Lycus* as a model for mimicry, has the following superficial characteristics:

(1) it is relatively large, ranging in length from 6,5 mm - 26 mm, with the elytra broadly dilated in the male, less so in the female;

(2) colour is a conspicuous orange-yellow, with usually the apical part of the elytra, antennae and tibiae and tarsi black (The black markings may vary in different geographical regions);

(3) it gathers gregariously on flowering shrubs for feeding or mating;

(4) it feeds on nectar, and is thus available as a model for a variety of potential mimics among other nectar (and pollen) feeding insects;

(5) it is slow moving and hovers over flowers;

(6) mating pairs remain together for long periods of time (the broader male usually completely covering the female);

(7) it is slow and conspicuous in flight, the hind wings being black-tipped;

(8) it "bleeds" freely, the slightest injury bringing forth a large drop of blood ("bleeding" is a mechanism upon which the lycid depends for repelling predators);

(9) it appears to be avoided in varying degrees by a variety of vertebrate predators (including lizards, birds, monkeys and frogs) and invertebrate predators.

According to Moore and Brown (1981), the beetles of this family show many "morphological, physiological and behavioural attributes that are associated with distasteful insects", which reinforces the above statement made by Linsley *et al.* (1961).

But according to Eisner *et al.* (1962), even though lycids appear to be unpalatable to a variety of vertebrate and invertebrate predators (tested previously Linsley *et al.* (1961)), it still seemed that they were subject to at least some predation. Individuals were occasionally found in the field bearing injuries

that appeared to be predator inflicted. Some cerambycids appeared to be imbibing the hemolymph (caused by the injury) and then chewing the thoracic muscles. The genus *Elytroleptus* (Cerambycidae) may to some extent still feed on the host plants it shares with lycids (it is a palatable Batesian mimic).

Linsley *et al.* (1961) noted that when lycid wings were removed from live specimens, a strong odour was released and the subject would not be accepted by a vertebrate predator. Marshall and Poulton (1902) noted that "South African lycids" emit a very strong-smelling, white fluid which I also noticed this when collecting lycids in the field. Large aggregations of both males and females were found feeding as well as mating on the same tree, while a tree a few metres away had no lycids on. This coincides with the observations made by Linsley *et al.* (1961) of a *Calopteron* sp. where some individuals were found feeding on small droplets of fluid secreted from the thorax beneath the wings of other individuals, and that the individual secreting the fluid even lifted the elytra so as to provide access to the site. This therefore implies that the fluid produced might be pheromonal and thus a means of sexual attraction.

Moore and Brown (1989) proved that the beetle *Metriorrhynchus* has full chemical protection at all levels viz. odour, taste and toxicity components. It can therefore be concluded that the "bleeding" responds in lycids have a duel action viz. pheromonal (sexual attraction) and defence.

Lycus may also play a role in the pollination of flowers. Forster (1988, 1989) observed these beetles flying from flower to flower, and by examining them, revealed numerous orchid pollinaria attached to the antennae, mouthparts and legs.

There is still much speculation about *Lycus* larval feeding habits. According to Withycombe (1926) and Mjöberg (1925), the normal larval food appears to be the juices of decaying wood, or perhaps fungi. Most of the larvae live under bark or in decaying trees. Arnett (1968) noted that the larvae are carnivorous, living under bark. Peterson (1951) stated that the larvae are lignivorous, and Gomes Alves (1967) found larvae on rotten vegetation. According to Lawrence (1982) "larvae occur under bark and in rotten wood, where they probably feed on slime mold plasmodium or the products of fungal metabolism". Crowson (1981), noted that Lycidae larvae appear to be non-predaceous, feeding on decayed material in logs etc., and that these non-predaceous larvae (practising extra-oral digestion) are derived from predaceous ancestors.

CHAPTER IV MORPHOLOGY

General Description

The genus *Lycus* is characterised by a soft body, dilated elytra and a rostrate head partly covered by the pronotum. The colouration varies considerably from luteous to ochraceous with a varying degree of black markings. Bocák & Bocáková's (1990) revision of the supergeneric classification of the family, based on the morphology, was the first comprehensive paper ever published.

4.1 HEAD

From the available literature it appears that there is little known about the morphology of the lycid head and associated mouthparts or about the feeding mechanisms. According to Snodgrass (1935), an understanding of the morphology of the arthropod head depends largely on a study of the head appendages and the cephalic nervous system.

Crowson (1981), noted some characters of floricolous beetles, which are all very prominent in *Lycus*:

(a) Development of long, serrate, dorsally inserted antennae.

(b) The head prolonged into a distal rostrum.

(c) Development of long setose maxillary and labial lobes, which are used as "licking lobes".

(d) Relatively large, finely faceted compound eyes.

DuPorte (1960) noted that the cranium in Coleoptera always conforms in structure to that of the prognathous head irrespective of the actual orientation. In Lycus the head is prognathous and will be described as such, although it is somewhat deflected.

4.1.1 Dorsal and lateral views of the head (Figs 2 & 3)

The posterior part of the head is bulbous and bears two large, oval, bulging eyes antero-laterally. Anteriorly, the head is produced in a long slender "beak" or rostrum which bears the mouthparts near its apex. A general characteristic is the complete absence of sutures on the dorsal and lateral aspects, with the exception of the clypeolabral suture (Cly.lbr.su) near the apex of the rostrum, which marks the line of union between the clypeus and labrum. Two very small rudimentary mandibles (Md) are attached to the head, immediately posterior to the lateral ends of the clypeolabral suture.

A distinct frontal bulge (Fr.b) occurs in the cranial wall between the eyes (E). Crowson (1972) refers to the frontal bulge as "a raised part of the frons", which is a characteristic feature of Lycidae. The relatively long 11-segmented serrate antennae are inserted close together in two large antennal sockets (An.s) on the anterior side of the frontal bulge. Immediately posterior of the frontal bulge, the head wall is depressed with two frontal pits (Fr.p) situated paramedially in this frontal depression (Fr.dep). A mesocranial suture (DuPorte, 1960) is absent.

Externally the clypeus (Cly) cannot be distinguished from the frons (Fr) as the frontoclypeal suture and frontal tentorial pits are absent. This is a characteristic of all members of the Cantharoidea (Lawrence, 1982).

Several criteria are used to distinguish the pre-oral clypeus from the post-oral frons when the frontoclypeal suture is absent:

(1) In the lower insects, at least, the front tentorial arms lie in the ventral ends of the frontogenal sutures at their junction with the frontoclypeal suture and therefore at the level of the true mouth. Although it is now generally accepted that the front tentorial arms may migrate dorsally or ventrally in higher insects, DuPorte (1957, 1960) claims that they retain their primitive position at the level of the mouth in Coleoptera and Hymenoptera.

(2) The frontal ganglion always retains its position at the level of the true mouth (Snodgrass, 1947).

(3) The cibarial dilators always originate in the clypeus, while the pharyngeal dilators originate in the frons (Snodgrass, 1947). However, DuPorte (1957) emphasised that muscles may change their points of origin on the skeleton, depending on functional needs. Matsuda (1965) stressed the fact that the point of insertion (instead of origin) of the cibarial dilators is as much a reliable landmark as the location of the frontal ganglion, "since it lies just anterior to the frontal ganglion, which usually demarcates the pre-oral clypeus from the post-oral frons".

According to DuPorte (1957) and Matsuda (1965) the second of these three criteria is the most reliable.

As both the frontoclypeal suture and front tentorial arms are absent in *Lycus*, only criteria (2) and (3) can be used to locate the borderline between frons and clypeus.

Criterion 2: Two very short frontal connectives connect the tritocerebral lobes (Tcl) of the brain to the frontal ganglion (Fr.gan), which is situated just antero-ventrally of the lobes and on the same vertical

level as the antennal sockets (An.s) (Fig. 3A, B & C). This suggests that the antennae are inserted on the extreme anterior border of the frons and that the clypeus extends from the anterior rims of the antennal sockets to the clypeolabral suture (Cly.lbr.su), thus constituting the dorsal wall of the rostrum. This interpretation is supported by the statement of DuPorte (1960) that the antennal sockets are situated very close to or actually against the frontoclypeal suture in most species of Coleoptera.

Criterion 3: The cibarial dilators (Cib.dl) have retained their primitive position, originating on the clypeus (Cly) and inserted on the dorsal wall of the cibarium (Cib) anterior to the frontal ganglion (Fr.gan) (Fig. 3B & D). The pharyngeal dilators (Ph.dl) which are inserted within the loops formed by the frontal connectives and posterior to the frontal ganglion, originate on the posterior sides of two transverse plate-like apodemes, extending inwards from the two frontal pits (Fr.p) in the frontal depression mentioned above. It is proposed that these apodemes are rudiments of the dorsal tentorial arms (D.t.a) (Fig. 3B) for reasons given later on (q.v. TENTORIUM).

4.1.2 Ventral part of the head (Figs 2 & 3)

The large, pear-shaped occipital foramen (Oc.fo) situated in the postero-ventral head wall, is encircled by a thickened postoccipital rim (P.oc.ri). Dorsally and laterally the postoccipital rim is completely fused to the headcapsule and the postoccipital ridge (as well as the postoccipital suture) is absent in these areas. Ventrally two gular ridges (Fig. 2(B & C), marked externally by two postoccipital (gular) sutures (P.oc.su), extend anteriorly for a short distance, ending in the posterior tentorial pits (P.t.p) and enclosing a short gula (Gu). The gula is an anterior extension of the ventral part of the postoccipital rim and is a similarly thickened part of the cranial wall (Fig. 3C). From the posterior tentorial pits two longitudinal inflections, the submentopostgenal inflections (Smt.pg.in), extend anteriorly, constituting the lateral borders of the elongated submentum (Smt) of the labium. The posterior end of the submentum is completely fused with the anterior end of the gula (Figs 2B & C, 3D).

The hypostomata (Hps) (Fig. 2B & C) are attached to the antero-lateral margins of the submentum and extend anteriorly as far as the lateral ends of the clypeolabral suture. They bear the maxillary articulations (Mx.a) at their posterior ends and the posterior mandibular articulations (P.md.a) at their extreme anterior ends. The longitudinal areas lateral of and completely fused to the submentum are anterior extensions of the postgenae (Pg) according to the criteria used by DuPorte (1960). The submentum and postgenae constitute the greater part of the ventral wall of the rostrum.

4.1.3 The Tentorium (Fig. 3B)

According to Crowson (1972, 1981) and Lawrence (1982), the tentorium is nearly always membranous in Lycidae, although a rigid tentorial structure was found in other Cantharoidea, such as Clauliognathus pennsylvanicus Degeer (Cantharidae) by Dorsey (1943).

In *Lycus* no trace of a membranous tentorium could be found. From each posterior tentorial pit a posterior tentorial arm (P.t.a) extends dorsad for a short distance, before splitting up in a short anterior branch and an even shorter posterior branch. The antennal depressor muscles (An.de.m) originate on these branches and are inserted on the ventral basal rims of the antennal scapes. A tentorial bridge is absent.

From each frontal tentorial pit (Fr.p), situated in the frontal depressions, a transverse plate-like apodeme extends inwards, as was mentioned above. The antennal levators (An le.m) originate on the anterior side of these apodemes, with their insertions on the dorsal basal rims of the antennal scapes. According to Snodgrass (1935), Matsuda (1965) and Richards & Davies (1977) the antennal levators usually originate on the dorsal tentorial arms. For that reason it is proposed that these apodemes are remnants of the dorsal tentorial arms. Stickney (1923) found that the external pits ("supratentorinae"), marking the points of attachment of the dorsal arms to the cranial wall, occur commonly only in the Staphylinoidea, although "the dorsal tentorial arms are surprisingly persistent structures in Coleoptera, considering the large number of genera that possess it in a more or less rudimentary state".

4.1.4 Antennae (Fig. 6B)

The antennae are prominent, 11-segmented, serrate, moderately compressed and are inserted dorsally between the eyes. They are less than half the length of the body, (probably modal in Coleoptera (Crowson, 1981) and are sparsely or densely setose. The scapus is stout, the second joint (pedicel) is short and transverse, the third elongate and may be longer or shorter in length to segments 4+5. Segments 4-10 (or sometimes 5-10) are short with the front angles of each prolonged to a varying degree, and decreasing in length and width, with the eleventh segment usually elongated and longer than the tenth. The form of the antennae may vary between males and females of the same species (*i.e.* in the prolongation of the front angles).

4.1.5 The feeding canal (Fig. 3B & C-F)

A tube-like structure, which will be referred to as the feeding canal, extends from a point immediately posterior to the clypeolabral suture, posteriorly through the head, continuing as the oesophagus (Oes) (Fig. 3B), from a point just anterior to the occipital foramen (Oc.fo). Applying criteria (2) and (3) which are used in demarcating the frons and clypeus, it can be deduced that the true mouth opening is situated at the level of, or just anterior to, the frontal ganglion. Consequently it can be accepted that the part of the tube anterior to the frontal ganglion, is the greatly elongated cibarium (Cib) (Fig. 3B). This fact is further confirmed by the dilators inserted onto its dorsal wall, which are in fact the cibarial dilators (Cib.dl) (Fig. 3B & D), according to the criterion of Matsuda (1965), since they are located anterior to the frontal ganglion (Fr.gan) and connectives. The part of the tube posterior to the frontal ganglion, is the pharynx (Ph) (Fig. 3B) onto which the pharyngeal dilators (Ph.dl), passing within the loops of the frontal connectives (Fr.co) (Fig. 3A & C), are inserted.

Further confirmation for this interpretation can be obtained by an examination of the structure and shape of the lumen of the feeding canal in cross section. Posterior to the frontal ganglion the feeding canal has a more or less four-sided lumen with narrow dorsal extensions at its dorso-lateral corners (Fig. 3C). Its ventral and dorsal walls have a similar degree of sclerotization, whereas its lateral walls appear membranous. Anterior to the frontal ganglion the lumen has a distinct crescent shape in cross section (Fig. 3D), the walls are sclerotized completely, but the ventral wall is distinctly more sclerotized than the dorsal wall.

4.1.6 The Mouthparts (Figs 2, 3)

The mouthparts are inserted on the apex of the rostrum, if it is assumed that the rostrum ends at the clypeolabral suture (Cly.lbr.su).

4.1.6.1 Labrum and epipharynx (Figs 2A & 3F)

The labrum erroneously named "clypeus" by Green (1949) is distinct, subquadrate or somewhat transverse, is movably joined to the clypeus by a very narrow membranous strip. The ventral side of the labrum, known as the epipharynx is membranous, carrying a dense array of short setae. The epipharynx is totally fused to the labrum. The apical margin of the epipharynx (which is slightly indented), is also lined with setae, forming a so-called apical fringe (Nel & de Villiers, 1988).

4.1.6.2 Mandibles (Fig 2A - D)

The mandibles (Md) are very small, slender, smooth and pointed apically. The molar lobes, as well as articulatory condyli or ginglymi, are absent. The bases of the mandibles are ventrally in contact with the anterior ends of the hypostomata (Hps) and dorsally with the antero-lateral margins of the clypeus (Cly). In the specimens examined they are about half the length of the labrum. They are considered to be non-functional and rudimentary, which coincides with the conclusion drawn by Nel & de Villiers (1988), that the mandibles of groups that feed on liquids are usually very reduced or simple. This coincides with the statement made by Bocák & Bocáková (1990), that in genera with a rostrum, the mandibles are strongly reduced and triangular.

4.1.6.3 Maxillae (Fig 2A &E)

The cardo (Cd) is a slender sclerite which articulates with the posterior end of the hypostomata (Hps). The cardo is not visible in ventral view as it extends ventrally from its dorsal articulation to the head and is attached at right angles to the proximal end of the stipes (St), which extends anteriorly. The stipes is elongated, with a distinct laterostipes on its lateral side. The four-segmented maxillary palpus (Mx.p) is attached to the distal end of the lateral stipes, terminal segment dilated. On its dorsal side the stipes bears a small membranous lacinia (Lc) mesad of the laterostipes (L.st). A larger membranous galea (Gl) is attached to the distal end of the stipes. The lacinia and galea each bears a dense tuft of long hairs. According to Crowson (1981) "the majority of floricolous beetles rely on hairy apical lobes on the maxillae and labium to mop up nectar on a sort of blotting-paper principle".

4.1.6.4 Labium (Fig. 2C)

The labium is extremely prolonged as a result of the rostration of the head. Posteriorly the submentum (Smt) is fused to the distal end of a short gula (Gu). The gula is confused with the submentum by Bocák & Bocáková (1990). Laterally it is fused with the elongated postgenae (Pg), but its lateral sides are demarcated by two longitudinal submentopostgenal inflections (Smt.pg.in). The distal end of the submentum is fused to a short, semi-membranous mentum (Mt) approximately at the level of the posterior ends of the hypostomata (Hps). Distally the mentum is fused to a long and slender prementum (Prmt), bearing a pair of three-segmented labial palpi (Lab.p) latero-distally. A short, densely setose lobe on the anterior tip of the prementum is the rudimentary ligula (Lig).

4.1.6.5 Hypopharynx (Fig. 3B & F)

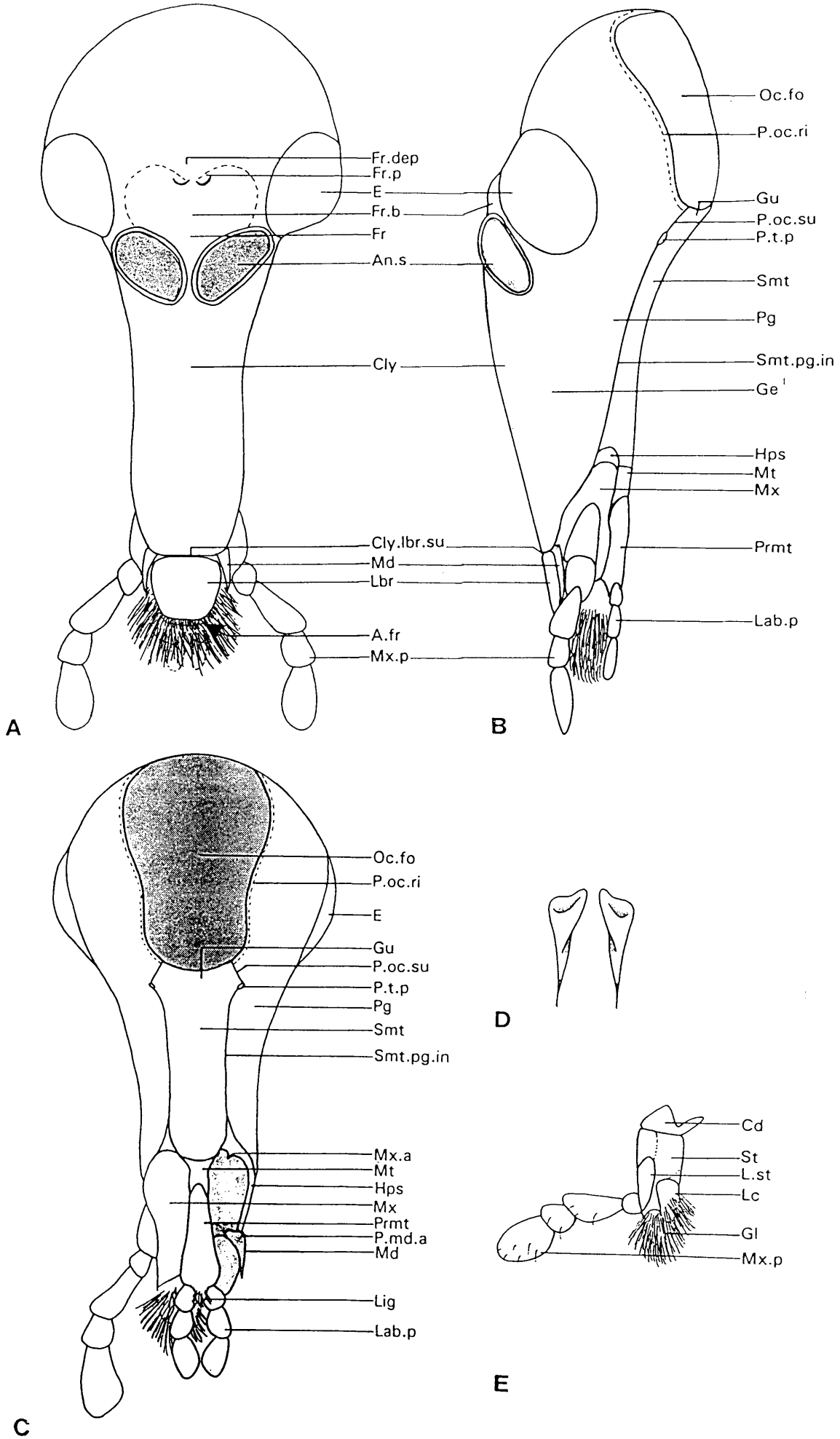
The membranous hypopharynx is fused to the basal half of the prementum and extends anteriorly as a flat, flap-like structure, with a rounded apex, as far as the anterior tip of the prementum. Its apical part bears an array of short, stiff setae dorsally, opposing those on the epipharynx.

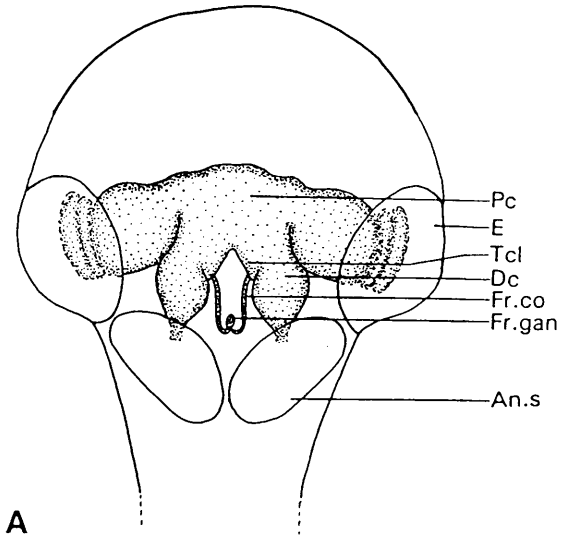
Two thin tubes passing through the occipital foramen (Oc.fo), extend anteriorly through the head below the feeding canal and "disappear" (in histological cross sections) approximately at the point where the hypopharynx is fused to the prementum, viz. the posterior end of the salivarium or pocket between the ventral wall of the hypopharynx and the opposing surface of the prementum. According to Crowson (1981) some of the most marked modifications of coleopteran mouthparts are amongst others ".... also perhaps the lack of single or paired salivary ducts opening on the hypopharynx." For want of a better explanation it is assumed that *Lycus* is an exception to the rule, and that these two tubes are in fact salivary tubes, opening to the exterior in the salivarium.

4.1.7. The feeding mechanism

The rostration of the head seems to be closely related to niche specialisation. In *Lycus* species which were actually observed feeding on nectar, the rostration seems to be a special adaptation to this type of feeding, the rostrum aiding them to reach deep-seated nectaries. This required the elongation of the clypeus, genae, postgenae and submentum, as well as the cibarium, on the one hand, and the intimate fusion of the clypeus to the genae and the submentum to the postgenae, on the other hand. The dense tufts of long hairs on the galeae, laciniae and ligula confirms the statement by Crowson (1981) that nectar feeding beetles use hairy apical lobes on the maxillae and labium for mopping up nectar on a sort of blotting-paper principle. The mandibles lost their original function and for that reason became rudimentary and immobile.

According to Snodgrass (1935), the cibarium in sucking insects is converted into a sucking pump. The dorsal wall of the cibarium is provided with strong dilator muscles arising on the clypeal region of the frontoclypeal plate of the cranium. By the action of these dilators the closed cibarial chamber becomes a pre-oral pump.
Likewise the muscles arising on the frontal region of the head-capsule, known as the pharyngeal dilators, relax when the cibarial dilators contract. This forces the food into the pharynx, by means of a "peristaltic movement".





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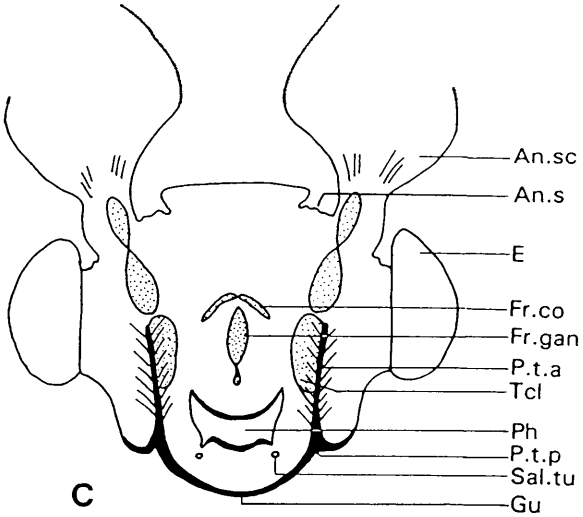

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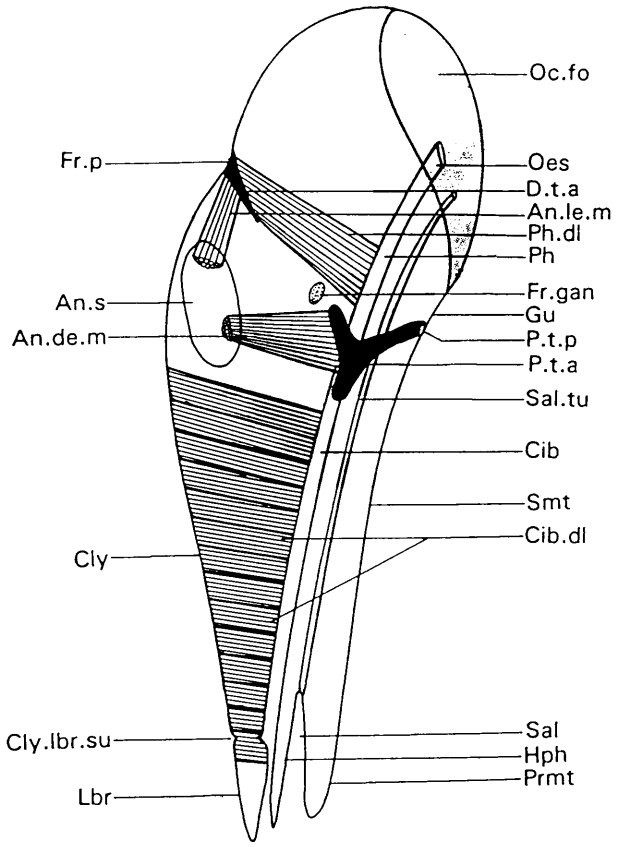

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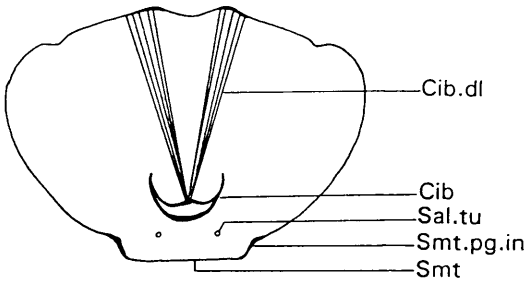

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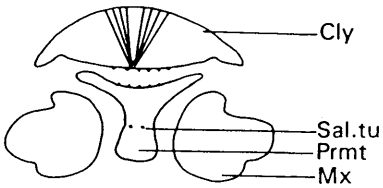

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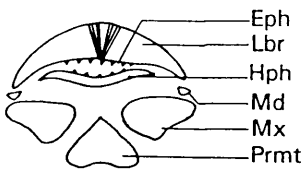

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4.2 NECK (Fig. 5A & B)

According to Crowson (1981), two pairs of cervical sclerites occur in Polyphaga. In *Lycus* each consists of an anterior elongated plate and a slender posterior plate (hardly visible beneath the anterior plate. The rest of the neck region is membranous, which allows for considerable movement of the head. The lateral cervical sclerites (L.c.sl) lie anterior to the so-called precoxal bridge (Campau, 1940), which corresponds to the pre-episternum (Prep) of Matsuda (1976) of the prothorax.

4.3 THORAX (Figs 4A & B, 5A & B, 6C)

4.3.1. Prothorax (Figs 5A & B, 6C)

The most outstanding feature of the pronotum (Prno) in *Lycus* is its shield-like appearance that partly covers the head and the dorsal parts of the pleura. It is more or less pentagonal, transverse, may be semicircular or nearly square, widest at the posterior end, with the anterior margin slightly prolonged medially, forming a subtriangular lobe. The sides are extended, flattened and reflexed. The latero-anterior angles vary from obtuse to rounded, while the latero-posterior angles are more or less acute and projecting moderately backwards. The median line is carinate at the apex, becoming more channelled towards the mesal part and then carinate towards the base. The surface varies in punctation (Fig. 6C).

A pleural suture (Pl.su) can be traced on each side from the edge of the pronotal shield curving ventrally, extending to the coxa (C). Just anterior of the coxa a triangular sclerite, the trochantin (Trc), is situated, and anterior to this the so-called precoxal bridge or pre-episternum (Prep) occurs, which widens till it reaches the pronotum dorsally. Ventrally the pre-episternum is fused to the basisternum (Bs). The small area posterior to the trochantin and the pleural suture is the epimeron, which is completely covered by the pronotum antero-dorsally.

The prosternum consists of a slender basisternum (Bs) that is situated ventrally between the two coxae. Anteriorly, the basisternum is fused to the episternum, forming the so called precoxal bridge antero-ventrally.

4.3.2. Mesothorax (Figs 4A, 5A & B)

The mesonotum is much smaller than the metanotum. All that is visible between the elytra is the black, lingulate scutellum (Sct). The prescutum (Prsc) is small, slender and hardly visible. Broader pre-alar arms (Pr.al.a) arise from the lateral ends of the prescutum. Latero-posterior to the prescutum is the scutum (Sc), which is divided into lateral halves by the scutellum. An inverted V-shaped scutoscutellar suture (S.sc.su), separates the scutellum from the scutum. The axillary cord (Ax.c)extends postero-laterally of the scutellum (Fig. 4A).

The mesopleuron is divided into a mesepisternum (Mses) and mesepimeron (Msem) by the pleural suture (Pl.su), which extends antero-dorsally from the coxa to the wingbase. The epimeron bears a pleural wing process (Plw.pr) dorsally. An arched, movable trochantin (Trc) can be seen ventrally on the mesopleuron, near the lower margin of the mesepisternum. Anterior to the propleuron, a large sclerotized tubular spiracle (Sp) occurs in a membranous area. This is the first thoracic spiracle (prothoracic stigmata of Bocák & Bocáková (1990)). The second is much smaller and is situated posterior to the mesepimeron (Fig. 5A).

The mesosternum consists of a well defined basisternum (Bs), extending ventrally between the coxae, slightly protruding over the metasternum at its posterior margin (Fig. 5B).

4.3.3 Metathorax (Figs 4B, 5A & B)

The metanotum is more or less twice larger than the mesonotum. The prescutum (Prsc) is visible anteriorly as a well defined sclerite. Posterior of the prescutum, the scutum (Sc) is represented by two halves, with their mesal edges curving upwards and outwards. The scutellum (Sct) has a long, thin anterior extension between the two scutum halves mesally, and is separated posteriorly from the scutum by the scutoscutelar suture (S.sc.su). A well developed postnotum (Pono) or intersegmental sclerite is situated posterior of the scutellum. Antero-laterally to the scutum is the so-called anterior notal wing process (of Daly *et al.* (1981) and other generalised textbooks), which according to Kukalová-Peck (1983) consists of the subcostal, radial and cubital axilare, closely associated with the first and second axillary. The tegula situated just anterior is now known as the precosto-costal proxalare (PRPCC). Likewise the posterior notal wing process is made up of the anal (PRA) and jugal proxalare (PRJ). The postnotum furcates antero-laterally into the jugal proxalare and postero-laterally into the post-alar arm (P.al.a) (Fig. 4B).

The metapleuron is divided into a metepisternum (Mtes) and a metepimeron (Mtem) by the pleural suture (Pl.su), which extends antero-dorsally from the coxa to the pleural wing process (Plw.pr). This differs from other Coleoptera (except Cantharoidea) where the pleural suture extends slightly dorsally and then completely anterior. This is a paedomorphic character (because it is an orthopteroid character) (Fig. 5A).

An anapleural suture (Apl.su) (pleurosternal suture of Crowson (1981)), widening anteriorly into a membranous cleft, divides the episternum into an anepisternum dorsally, and a pre-episternum ventrally. The pre-episternum is fused ventrally with the basisternum (Bs) as in other Coleoptera. A median longitudinal groove (Me.lo.g) divides the basisternum into two equal lateral halves. The metasternum is long, wide, and emarginate between the coxae (Fig. 5B).

4.4 ABDOMEN (Fig. 7D-G)

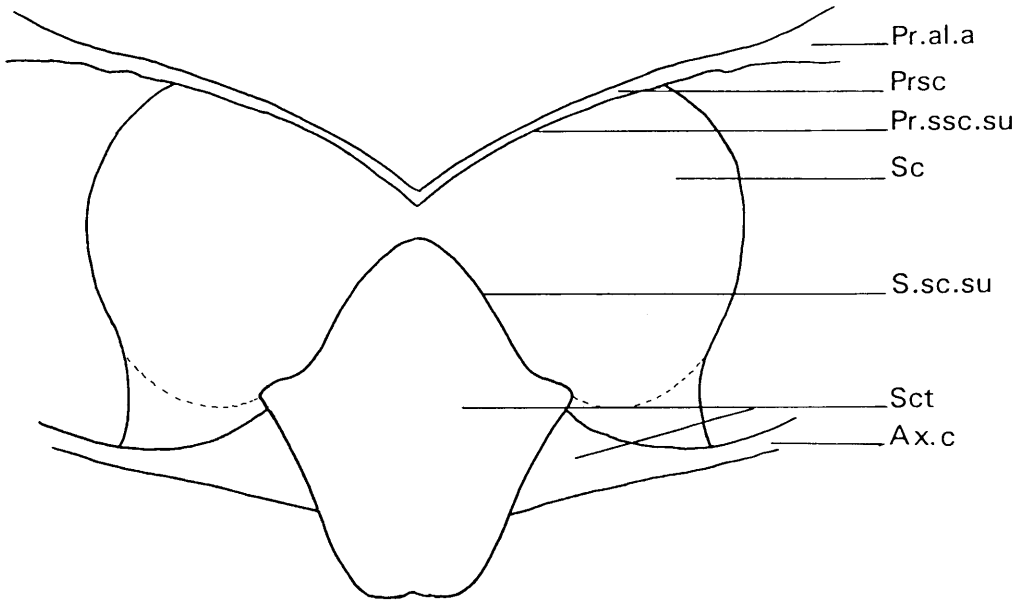
There are eight visible sternites (nine tergites) in the male and seven (eight) in the female. This is the so-called hologastrous type of abdomen of Jeannel & Paulian (1944). The first abdominal sternite is always unrecognisable (so that there are in actual fact nine abdominal segments in the male and eight in the female). The second sternum is fully sclerotized and distinct from the third (tergite 1 having no corresponding sternite).

The apical angles of all the abdominal sternites, except for the terminal one (genital segment), are more or less acutely produced posteriorly in both sexes.

In the male sternite nine (terminal segment) has a well developed subgenital plate which is an elongated prolongation of the ninth sternum, with the apical angles strongly, forming an arcuate or deep emargination postero-medially (Fig. 7D & E).

In the female, sternite eight is semi-circular and is notched at the apex. The last tergite is elongated and extended medially (Fig. 7F & G).

There are eight abdominal spiracles in both sexes, with the first (posterior to the postnotum), being an elongated slit and the rest tubular (Fig. 7D).



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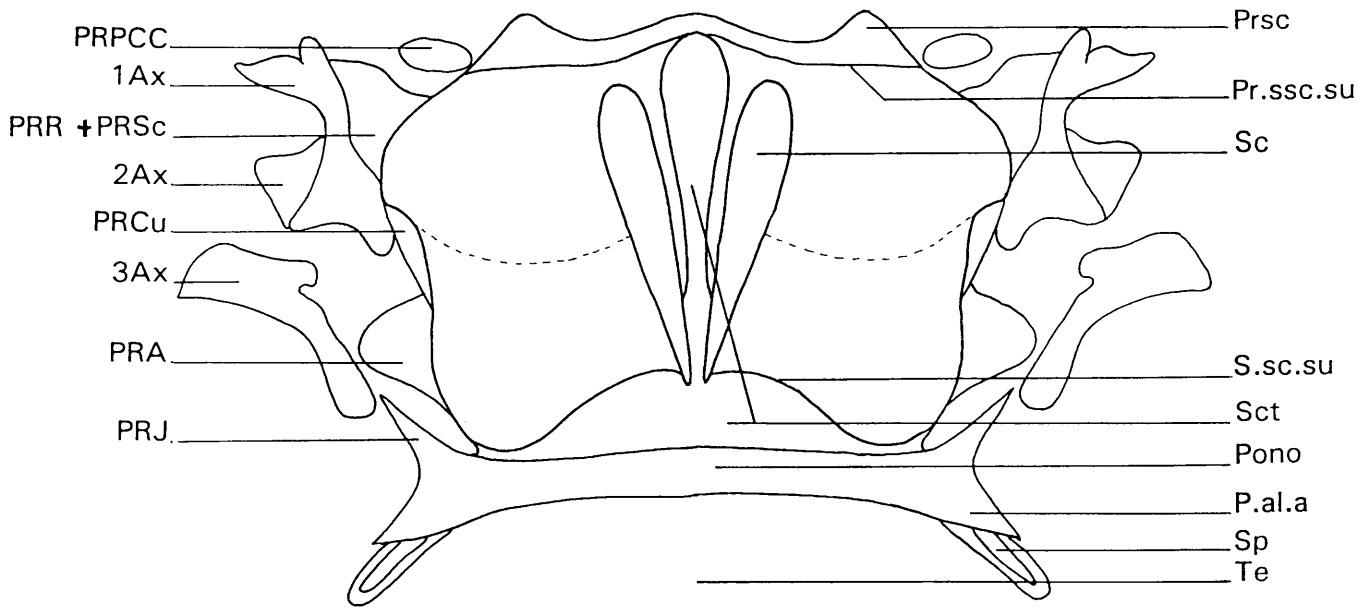

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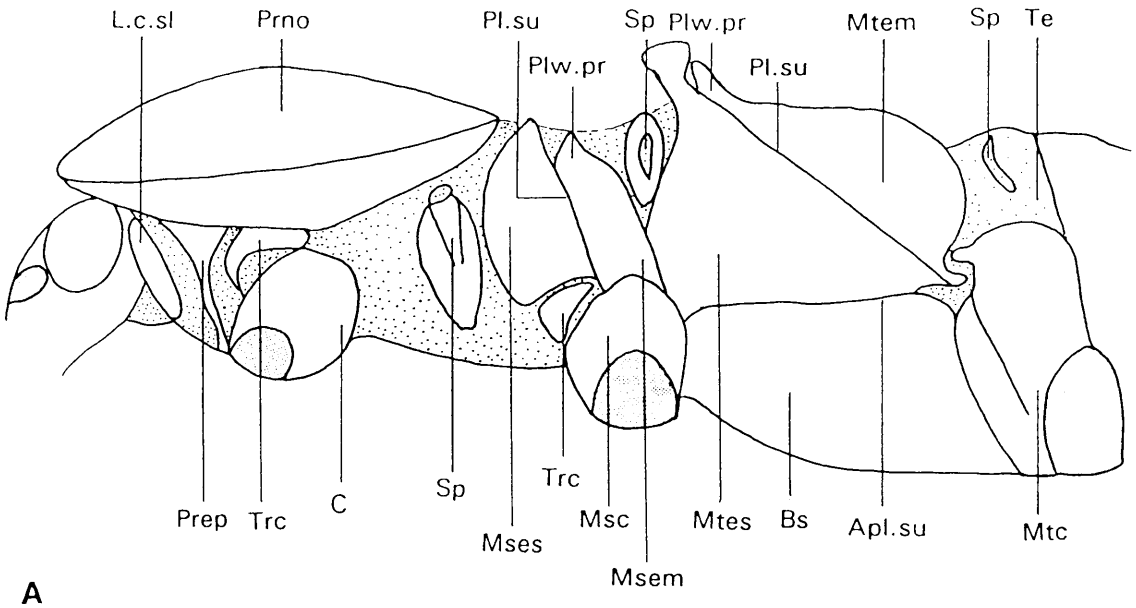

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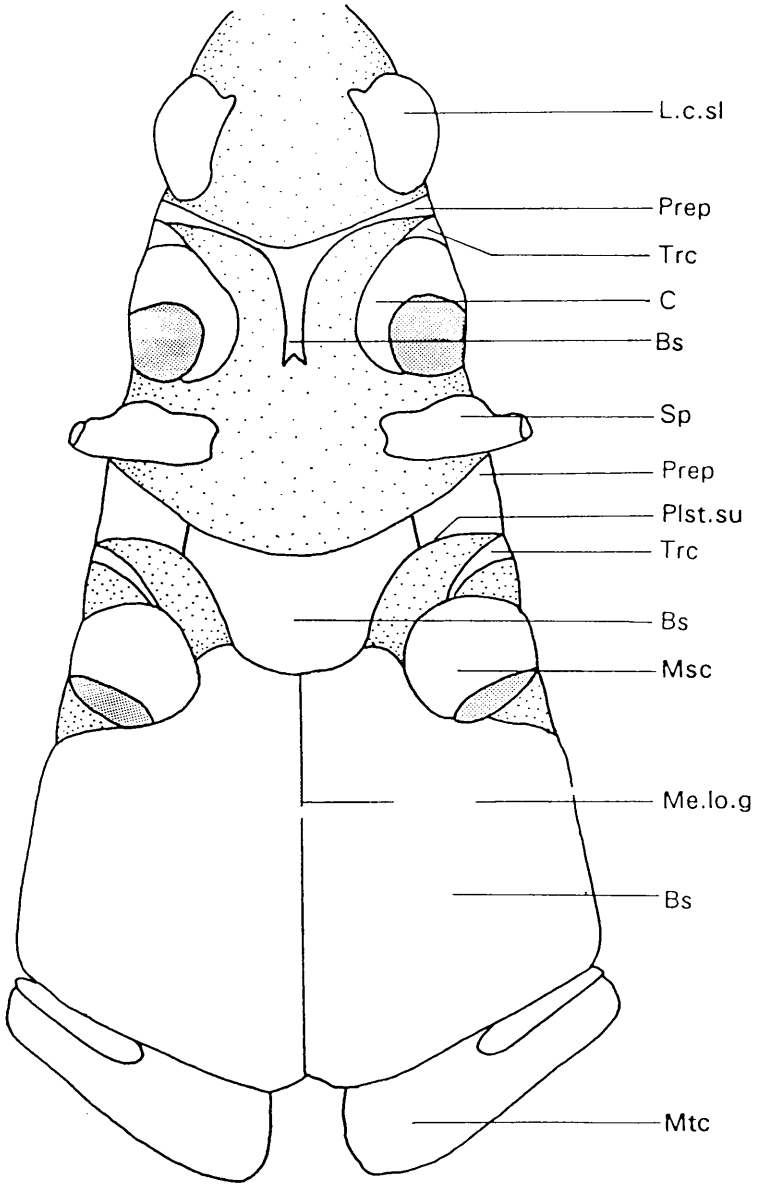

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4.5 LEGS (Fig. 6D)

The fore- and middlelegs are similar in form. The fore- and middle coxae are stout, with the fore- coxa conical and the middle coxae obliquely separate. The hind coxae are much larger and are contiguous, short and transverse (Green 1949).

The trochanters (Trg) are small, long and interstitial. Femora (Fe) and tibia (Ti) are compressed and obtusely dentate, pressing into each other ventro-dorsally. The tibiae are more slender than the femora and possess two apical spurs (Ti.sp). The males also possess sexually dimorphic characters on the femora and tibia. (This will be discussed fully in the next chapter). Tarsal formula is 5-5-5 (Ta). Segments 1 - 4 have adhesive, lobe-like apical pads, which are densely setose. Segment five is long and slender (without pad) with two simple claws (Cl).

4.6 ELYTRA (Fig. 6A & E)

A great deal of variation occurs in the colour and form of the elytra, the colour varying from luteous to ochraceous, with a varying degree of black markings. The form is also very variable intra- and interspecifically (especially in the males), in some species being much more dilated than in others. The males also possess sexually dimorphic characters on the elytra (see next chapter). In the females the elytra are less dilated, resulting in the general form being more subparallel and elongated (than in the males), making the females of different species hardly distinguishable.

Odd or even numbered costae (Co) may be most prominent, usually four discal costae (the nearest the suture is designated the first, and the nearest the lateral margin the fourth, or humeral costa) (Green, 1949). The intervals between the costae are reticulate, with irregular and transverse raised lines, which may form either one or two rows of reticulate cells (R.ce), or be indistinct forming a reticulate network (R.net). The sutural margin (Su.mar) may be straight or curved (see p.43). The elytra may be glabrous, matt or very setose (Fig. 6E).

The epipleura (Epl) *i.e.* the lateral part of the elytral margin which is swollen and inflexed may be very prominent or indistinct. The swellings are hollow and filled with air, a device according to Green (1949), which provides strength without weight. In the males this is also a sexually dimorphic character (see later) (Fig. 6E).

Wing venation is of the cantharid type (Richards & Davies 1977). The hindwing is elongated, with a reduced membrane, and a long, vertically closed radial cell (Lawrence 1982). According to Bocák & Bocáková (1990), the wing venation is primitive and uniform (Fig. 6A).

4.7 GENITALIA (Fig. 7A-C)

4.7.1 Male genitalia (Fig. 7A & B)

The aedeagus is of the typical trilobate type, with the median lobe (Me.l) (penis) being long, slender, tubular and variously modified apically. The median lobe is flanked by a short pair or parameres (Pa) (fused to the median lobe). The basal piece (Ba.pc) (phallobase) is proximal and well sclerotized. The aedeagus lies within the genital segment (S_9), which is triangular in shape and serves as a protective capsule for the male genitalia. The genital segment is composed of a small ventral, large dorsal and a pair of lateral plates.

4.7.2 Female genitalia (Fig. 7C)

The female genitalia consist of large, broad paired coxites (Cx) (hemisternites) with two small styli (Sty) (armed with bristles) posteriorly. Two long, slender, sclerotized valvifers (Va) are present anteriorly. The female genitalia are also protected in a genital segment (S_8).

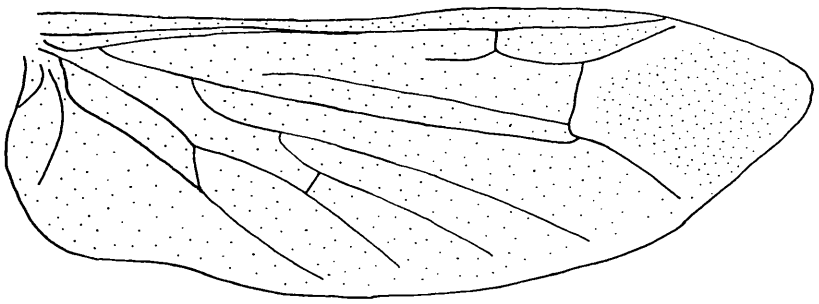
4.8 LARVAE

The larvae were found to be elongate, fusiform and depressed *i.e.* of the trilobite type, with the pro-, meso- and metanota forming three distinctly extended plates. The larvae are ochraceous in colour with dark brown-black markings. The large, triangular pronotal plate partially covers the elongated head. The meso- and metanota are transverse and subequal.

According to Lawrence (1982) the head of the larvae lacks frontal arms. The antennae are 3-segmented. One pair of ocelli is present on either side of the head. The labrum is reduced, fused to the clypeus and frons, forming a nasale. Crowson (1981) noted that in the larvae and pupae, each mandible is split into 2 nearly straight, pointed sclerites, which together enclose a suctorial tube, almost like the mandibles and maxillae of Neuroptera larvae. Lawrence (1982) described the mandibles as without a mola. In the maxilla, the galea is one-segmented and the lacinia is reduced. The stipes and the mentum are completely fused, without a suture between them. The maxillary palpi are 3-segmented and the labial palpi

2-segmented. The mouth is modified for liquid feeding, as in Elateroidea. According to Crowson (1981) a very slender oesophagus is found in liquid-feeding larvae (Lycidae). Extra-oral digestion, involving the ejection of enzymic juices into or onto the food outside the insect, is followed by the ingestion of the predigested material.

The legs are 4-segmented. The abdomen is nine-segmented. The tergites and sternites are transverse with prominent, acutely pointed extensions laterally. The last tergite is subsquare.



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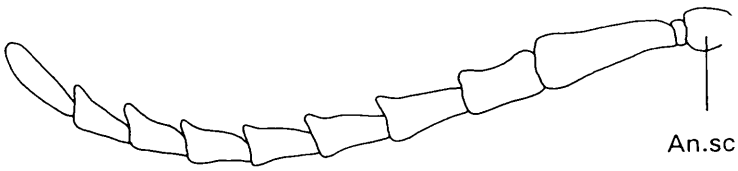

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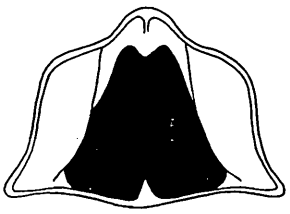

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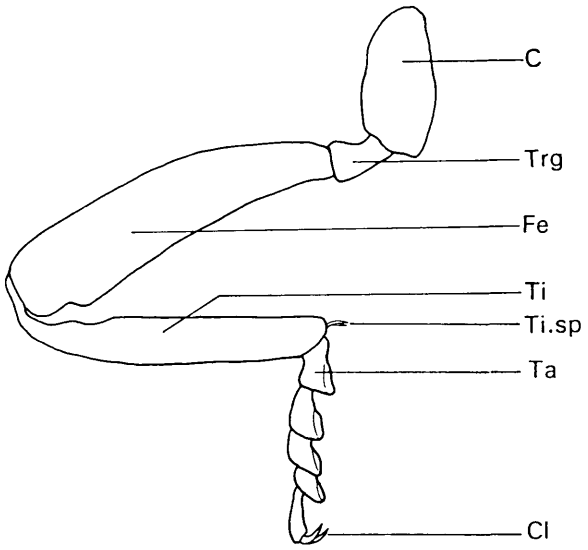

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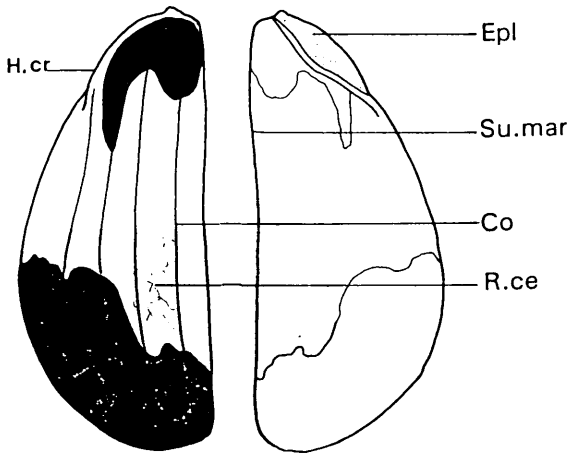

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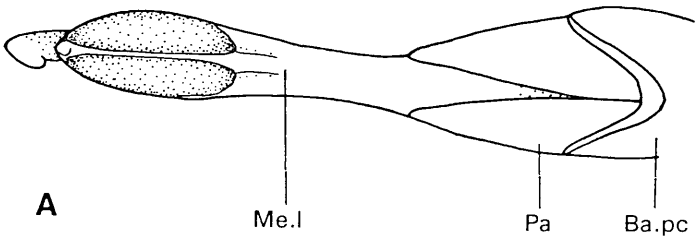

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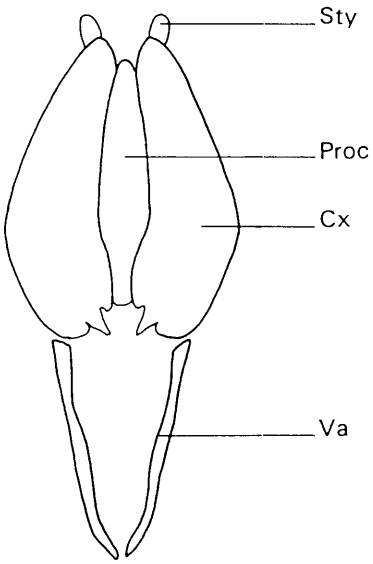

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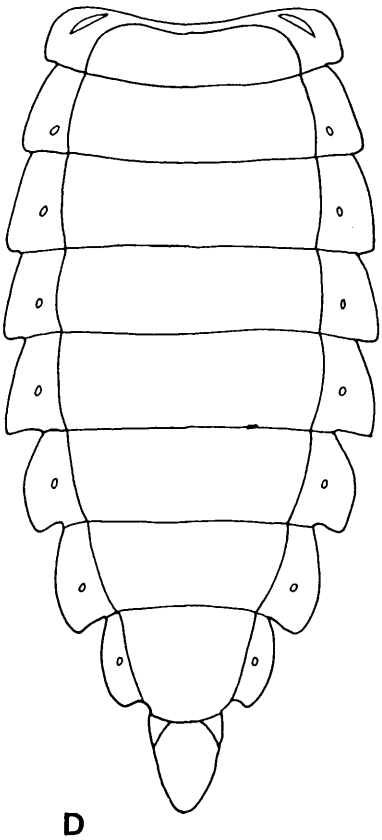

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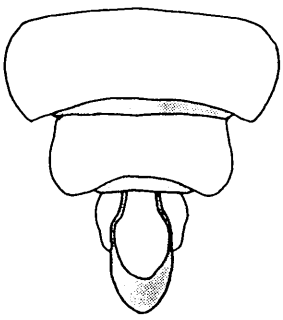

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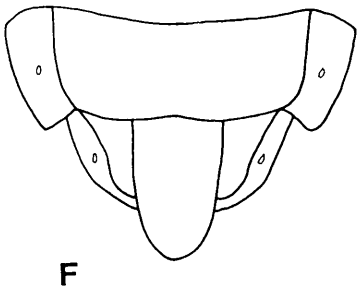

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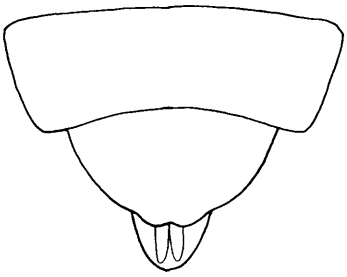


G

CHAPTER V TAXONOMY

The family most closely related to the Lycidae is the Homalisidae (Crowson 1972), which was first placed under the family Lycidae as a subfamily (Kleine 1933, Green 1949). Bocák & Bocáková (1990) in their supergeneric revision of the family Lycidae, noted that in the Lycinae, the tribes Calopterini and Lycini are sister-groups. The Lycini are found in all the zoogeographical regions except the Australasian. The genera, *Lycus* with an Afrotropical distribution, and *Lycostomus* with an Oriental distribution, (also found in the Holartic and Neotropical regions), are closely related (Bocák & Bocáková 1990).

5.1 GENUS *LYCUS* FABRICIUS

Lycus Fabricius, 1787:163; Bourgeois 1901:32; Kleine 1933:6; Green 1949:56.
(5 described species viz.: *latissimus* L., *rostratus* L. (described under the genus *Lampyris*), *palliatus* F., *proboscideus* F. and *ferraticornis* F. (genus *Pyrochroa*).

Description (According to Bourgeois (1901) and Green (1949)).

Size: length 6,5-26mm; width 3-20mm.
Colouration: luteous / ochraceous with varying degree of black markings.
Head: rostrate; mouth anterior; frons with frontal bulge and (more or less) depressed behind bulge between eyes; bearing two pits; eyes large and oval; antennae 11-jointed, serrate, moderately compressed, less than half length of body, densely or sparsely setose and inserted dorsally between eyes; pedicel not quite contiguous, second joint short and transverse, third long and elongate; labrum free, subquadrate or transverse, apex not emarginate, with two small, slender, smooth, nearly straight, acutely pointed apically, mandibles (their tips are distant when mandibles are closed), not or just extending beyond labrum; maxillary palpi 4-segmented, apical joint variously modified.
Pronotum: roughly pentagonal, sides broadly explanate, reflexed; widest posteriorly (base); anterior (apex) produced in a short subtriangular lobe, anterior angles variable, extending forward when prominent; median line briefly carinate at apex, thence more or less distinctly channelled posteriorly; posterior angles acute.
Thoracic spiracles: tubular and prominent.
Scutellum: oblong, lingulate.

Elytra: rugose, punctate varying in pubescence; with feebly elevated, narrow, discal costae, third less distinct, fourth very prominent at humerus, (sexes often dissimilar); intervals reticulate with irregular and transverse raised lines (reticulate cells); form of elytra varies between males and females (except for subgenus *Haplolycus*), colouration similar.

Legs: coxae intermediate distance, anterior coxae closely approximate; tarsi, first joint obconic, second and third obcordate, fourth bilobed, last one slender; claws simple.

Male genitalia: aedeagus with median lobe long, narrow, well developed and tubular, variously modified; parameres very short and partially or totally fused to median lobe distally; basal piece large, well sclerotized.

Abdomen: foliaceous; male with eight visible sternites, ultimate one oblongate; female with seven visible sternites, ultimate one subtriangular.

Diagnosis

This genus is characterised by the distinctive ochraceous and black aposematic colouration; rostrate head, partly covered by a scutate pronotum; soft body; dilated, reticulate elytra; and a distinctive aedeagus (a more detailed generic diagnosis can only be produced after a revision of all the species and other genera in the Lycini).

5.2 DISCUSSION OF THE SUBGENERA

5.2.1 Introduction

There is still much confusion about this large variable genus. Bourgeois (1883a) studied a limited number of species (53), when he defined the seven Afrotropical subgenera. With the more or less 300 species known today in Africa (although I consider roughly one-third to be variations which should therefore be synonymized), these subgeneric categories have become very outdated (with the exception of *Haplolycus* and *Merolycus* which constitute clearly defined groups). Bourgeois (1883a) also described two subgenera *i.e. Neolycus* (North America) and *Thoracocalon* (Dugès) (North and South America). *Lycostomus* Motschulsky (Asia and Malaysia) was considered as a "subgroup" of the subgenus *Haplolycus*. Bourgeois (1901) made *Lycostomus* a subgenus, which included the two "subgroups" *Haplolycus* and *Lycostomus*, based on the geographic distribution and the form of the male genitalia. Marie (1968) confirmed this, but synonymized the subgenera *Haplolycus* and *Lycostomus*. Kleine (1933), in his catalogue, distinguished between the subgenera *Haplolycus* and *Lycostomus* (*i.e.* 10 described subgenera). Green (1949), in a paper on the Lycidae of the United States and Canada, described a new subgenus *Lyconotus*. Marie (1968) described *Concavolycus* from the Congo (discussed later).

Bocák & Bocáková (1990) considered *Lycostomus* as a distinct genus, but noted the similarity to the subgenus *Haplolycus*. (Both do not display sexual dimorphism in the elytral shape.) Bocák & Bocáková (1990) did not mention the *"Lycus"* species of North and South America with dilated elytra. The illustrations of the male aedeagi by Green (1949), indicate a slight difference in shape to the African species, as do the figures and descriptions in Linsley *et al.* (1961) (males with dilated elytra - not as in *Lycostomus*). By examining the form of the male genitalia, the phenetic distance existing between these three areas (*i.e.* Africa, Asia and North and South America) is similar. Therefore three genera (*i.e.* *Lycus*, *Lycostomus* and the "American" species) could be considered, but the differences do not appear to be significant to suggest this, I would therefore propose three subgeneric categories.

The " African" subgenera cannot be separated in key form. There is a considerable overlap of characters, to such an extent that some species may be placed in anyone of three different subgenera (if the Bourgeois subgeneric classification is followed). This is clearly highlighted with the many homonyms and synonyms that were found (see discussion later). The major character that Bourgeois overlooked, in his artificial arrangement, is the form of the male genitalia, which seems to be the most significant morphological character. Many earlier authors like Kleine (1935b) and Marie (1968) have also commented on this situation, but have not produced a new system. Kleine (1937) noted that variation is enormous, even between different species.

Since a considerable overlap of characters exists, it is necessary to establish a uniform method by means of which species could be grouped (when there does seem to be clear grouping). This requires a thorough examination of morphological variations and similarities between species. It is evident that certain natural species groups exist and with such a large variable genus there is a necessity to group similar species together so as to simplify the classification. The question arises, however, whether species groups are going to be introduced, (which are without taxonomic status and solely used for the sake of convenience), or definite subgeneric categories (with phylogenetic significance). In this revision species groups are proposed.

5.2.2 History and Discussion of groups/subgenera

5.2.2.1 Definition of groups by Murray (1868)

Murray (1868) proposed 3 groups, based primarily on the so-called sexual dimorphic characters of the elytra:

(1) Males with dilated elytra, and prominent humeral crests, but not spined. Females with elongated (narrow) elytra. He placed 10 species in this group.

These are included in the subgenera *Lycus*, *Lopholycus*, *Merolycus* of Bourgeois (1883a) (discussed later). The species *ustus* Murray, is placed in the subgenus *Haplolycus* (Bourgeois 1883a), but was described from a female specimen and is therefore not acceptable, as all female specimens of the genus *Lycus* have elongated elytra, which is a distinguishing characteristic of the subgenus *Haplolycus*.

(2) Males with humeral crest terminating in a spine. Females elongated, and with the slight humeral crest without a spine.

He placed three species in this group, of which *praemorsus* and *elegans* have now been synonymized with *latissimus* L. and *aeolus* with *melanurus* Dalman in the subgenus *Acantholycus* (Bourgeois 1883a).

(3) Elytra elongated and attenuated at the apex. The elytra in neither sex dilated, nor armed with blades or spines on the humeral crests.

Only one species *sinuatus* Dalman, belongs to this group, which belongs to *Haplolycus* (Bourgeois 1883a).

5.2.2.2 Definition of subgenera by Bourgeois (1883a).

As previously mentioned, Bourgeois (1883a) proposed nine subgenera, of which only seven have representatives in Africa (and will thus be dealt with here). These categories were formed on the basis of elytral characters with the exception of *Merolycus* which was based on leg characters:

(1) *Acantholycus* Bourgeois, 1883a: 59.

Type species: *Lycus (Acantholycus) praemorsus* Dalman, 1817. (synonymized with *Lycus (Acantholycus) latissimus* (L.), 1767) by Waterhouse 1879.

Diagnosis

Elytra: dissimilar in sexes. Legs: simple.

Male: elytra largely dilated (foliaceous) laterally, suborbicular or suboval, truncate at the extremities, internal angle of truncation spiniform. Prominent humeral crest and spine.

Female: elytra ovally elongated, rounded at the extremities, slight humeral crest evenly rounded.

Remarks

Bourgeois (1901) noted that aedeagus terminates in a sharp pointed process. Kleine (1935a) noted that in the species *latissimus* (L.), the form of the elytra is extremely variable *i.e.* from truncate to rounded. According to Marie (1968), characters like the humeral crest, spine and truncation, includes all forms up to perfectly rounded, which according to Bourgeois (1883a) is the prerogative of the subgenus *Hololycus* exclusively.

2. *Hololycus* Bourgeois, 1883a: 59.

Type species: *Lycus (Hololycus) intermedius* Bourgeois, 1884.

Diagnosis

Elytra: dissimilar in sexes. Legs: simple.

Male: elytra as in *Acantholycus*, evenly rounded at the apex, not truncate, with or without a humeral spine. (Female similar to *Acantholycus*).

Remarks

Bourgeois (1901) noted that the form of the aedeagus is simple and tapers to a long point. According to Kleine (1937), the interpretation of this subgenus is difficult as the species are very heterogeneous and not easily distinguished from *Acantholycus*.

3. *Lopholycus* Bourgeois, 1883a: 59.

Type species: *Lycus (Lopholycus) raffrayi* Bourgeois, 1877.

Diagnosis

Elytra: dissimilar in sexes. Legs: simple.

Male: elytra obcordiform, humeral crest may range from hardly visible to enormous, but always entirely rounded, sometimes extending ventrally (*i.e.* epipleura); a humeral spine may be present.

Female: elytra subparallel, with a less prominent humeral crest.

Remarks

Bourgeois (1901) noted that the aedeagus is similar to *Hololycus*. Marie (1968) and Kleine (1937) noted that this is a very difficult subgenus to diagnose because it comprises all possible forms. The diagnosis by Bourgeois (1901) is therefore not considered to be valid.

4. *Lycus* Bourgeois, 1883a: 60.

Diagnosis

Elytra: dissimilar in sexes. Legs: simple.

Male: elytra largely dilated, slightly oval, sometimes oblong, with a humeral crest; between the 2nd and 4th costae there is a more or less prominent hump, simple or armed with a long spine.

Female: elytra are subparallel without a humeral hump.

Bourgeois (1883a), divided this subgenus into 4 groups:

Group 1. Type species: *Lycus aculeatus* Bourgeois, 1880: 160.

Diagnosis

Elytra: elongated, with a small tooth at the apical angle, sometimes also in the female, but to a lesser degree.

Group 2. Type species: *Lycus latissimus* (L.) 1767. (*latissimus* is now placed in the subgenus *Acantholycus* (Bourgeois (1901)).

Diagnosis

Elytra: rounded at its apex in both sexes.

Male: humeral hump may be armed with a spine and may be straight or contoured.

The species *latissimus* (L.) was placed under this subgenus because of the rounded extremities of the elytra. In this variable species, all possible forms, from truncate to rounded extremities exist.

Group 3. Type species: *Lycus obtusatus* Thomson 1858: 76.

Diagnosis

Elytra: rounded apically in both sexes.

Male: elytra elevated above in a hump ("bloatation"), more or less noticeable in the mesal part of the disc; the suture is elevated and prominent along its entire length.

Group 4

Type species: *Lycus ampliatus* Fåhraeus, 1851: 432.

Diagnosis

Elytra: rounded apically in both sexes.

Male: elytra uniformly subconvex and swollen along the 1st costa; the longitudinal suture is simply emarginate and not elevated and does not include the extremities of the elytra.

Remarks

Bourgeois (1901) noted that there are two distinct groups based on the form of the aedeagus:

(a) aedeagus terminating in a sharp, pointed process (which is similar to *Acantholycus*);

(b) aedeagus simple, tapering to a long, pointed process (which is similar to *Hololycus* and *Lopholycus*).

According to Marie (1968), the elytra are very dilated in the male, but this subgenus also includes all possible forms.

5. *Chlamydolycus* Bourgeois, 1883a: 60.

Diagnosis

Elytra: dissimilar in both sexes. Legs: simple.

Male: elytra laterally dilated; at more or less 1/2 or 2/3 of the elytra, there is a large rounded expansion produced by a bloatation (swelling) of the intervals that separate the two external margins.

Bourgeois (1883a) divided the subgenus into two groups:

Group 1

Type species: *Lycus trabeatus* Guérin-Méneville, 1835: 45.

Diagnosis

Male: dilated elytra are flat or nearly flat, stretching laterally on the same plane as the disc, convexly folded underneath.

According to Winkler (1964) *Lycus trabeatus* may be regarded as one of the most highly specialised members of this genus.

Group 2

Type species: *Lycus elevatus* Guérin-Méneville, 1847: 228.

Diagnosis

Male: in dorsal view elytral dilation elevated laterally, folding upwards and inwards and then bluntly underneath to form a rounded margin with large lateral edges.

Remarks

Bourgeois (1901) noted that the aedeagus is similar to *Acantholycus* and *Lycus*. *Lycus elevatus* was considered the "type" species of this group, but has now been placed in the subgenus *Lycus* (by later authors), because of the form of the elytra, although there is a distinct similarity in the form of the aedeagi of both *elevatus* Guérin-Méneville and *poultoni* Bourgeois.

According to Kleine (1937), the subgenus *Chlamydolycus* is composed of only five species which occur in western and southern Africa, but that the validity of this subgenus should be carefully studied.

6. *Haplolycus* Bourgeois, 1883a: 62.

Diagnosis

Thorax and elytra similar in both sexes. Legs simple.

Male: elytra are subparallel or oval, very elongated, and moderately to largely setose.

Bourgeois (1883a), divided the subgenera into groups according to their geographical distribution:

(1) African:

Type species: *Lycus congener* Gerstaecker, 1871: 55.

(2) Asiatic and Malaysian:

Type species: *L. melanurus* Blanchard, which according to Kleine 1933 is now synonymized with *Lycostomus marginatus* F.

The majority of species according to Kleine (1933) placed under the subgenus *Lycostomus* are now considered to be Asian, but a few occur in North America.

(3) North American:

Type species: *L. semiustus* Chevrolat which according to Kleine (1933) has now been placed in the subgenus *Lycostomus*.

Remarks

Bourgeois (1901) proposed that the subgenus *Lycostomus* consists of two groups viz.:

(a) *Haplolycus* with aedeagus terminating in a sharp point and

(b) *Lycostomus* with aedeagus not pointed and unarmed).

These groups are also distinguished by their distribution (*Haplolycus* with an African, and *Lycostomus* with an Asian distribution).

Marie (1968) synonymized *Haplolycus* with *Lycostomus*.

7. *Merolycus* Bourgeois, 1883a: 61.

Diagnosis

Legs: toothed or subtoothed at the apex of each femur in at least one of the three pairs of legs. Tibiae deeply hollowed out at the base, acting as a receptacle for the femoral tooth.

Elytra: dilated at the humerus into an enormous swelling (humeral crest) as in *humerosus* Fåhraeus, or having the same form as in the subgenus *Lycus*, or oblong or suboblong as in *rostratus* (L.).

Bourgeois proposed two groups according to the presence of spines on the legs:

Group 1

Type species: *Lycus (Merolycus) rostratus* (L.), 1767: 646.

Diagnosis

Legs: middle- and hindlegs toothed and broadened, the forelegs sometimes subtoothed.

Group 2

Type species: *Lycus (Merolycus) humerosus* Fåhraeus, 1851: 429.

Diagnosis

Legs: middle- and hindlegs simple, forelegs toothed and broadened.

Remarks

Bourgeois (1901) noted that the aedeagus is curved, unarmed and not pointed. According to Kleine (1937), the form of these species is not very uniform.

5.2.2.3 Definition of a new subgenus by Green (1949).

Green (1949) proposed a new subgenus *Lyconotus* which differs from the subgenus *Lycostomus*.

Type species: *Lycus lateralis* Melsheimer.

Diagnosis

Sterna: prosternum not longitudinally compressed; mesosternum not protuberant; inner angle of metacoxae not produced posteriorly.

Legs: tibial spurs minute, acute and similar throughout; male with trochanters spinose; metafemora and metatibiae strongly arcuate.
Aedeagus: aedeagus and sternite 9 both abruptly bent downward medially.
Elytra: elytra not broadly dilated in the male.

5.2.2.4 Definition of a new subgenus by Marie (1968).

Marie (1968) proposed a new subgenus viz.: *Concavolycus* before clarifying the original subgeneric state, although affirming that the whole system was in a chaotic state.
Type species: *Lycus maublanci* Pic.

Diagnosis
Elytra: humeral callus small, right-angled (to the elytra), blunt, extending a little laterally past the contour of body; rest of elytral contours are externally round and flat, maximum width is greater than length; epipleura with external edge strongly reflected forward, forming a crest on external contour extending concavely over body; part covering body also convex; concavity of elytra only apparent in posterior half (also found in female) permits attribution of position of subgenus.
Remarks
This subgenus is composed of three species viz.: *maublanci* Pic, *kerandeli* Bourgeois and *cornipennis* Bourgeois. The elytra of the male distinguish this subgenus from the subgenus *Lycus* (Marie 1968).

5.2.3. Conclusion

From the above discussion it is clear that the definitions by Bourgeois (1883a) of subgeneric categories are no longer applicable. These subgenera are still in use to coincide with the literature (more uniform) until a further comprehensive study of the whole genus is completed. An examination of all morphological and geographical variation, similarity, distribution and clear distinctions between all the species of the genus, are required before a new system can be proposed.

Since the study includes only a limited number of species from the southern African region, no clear subgeneric categories can be proposed. However with all the literature studied, a new system can be suggested which may give a indication as to what species constitute natural groups, serving as a foundation for future workers.

I propose a grouping of species with similar aedeagi (as natural groups associated with other characters seem to occur). Therefore the term group instead of the formal term subgenus is more appropriate and is necessary to facilitate the study of such a large group.

The two subgenera *Haplolycus* and *Merolycus* form natural groups and are at present the distinct groups that can be distinguished on the basis of elytra and leg characters in association with male genitalia form:

1. *Haplolycus* - male and female elytra similar - elongated *i.e.* no sexual dimorphism.
2. *Merolycus* - with the femora of the legs in the males thickened and spinose and the tibia spinose (variation in fore-, middle- and hindlegs) - in the female the legs are simple.

5.3 DISCUSSION OF SPECIES CHARACTERS

5.3.1 Characters used

The primary purpose of a description is to serve as a diagnosis, and the most practical, important, diagnostic characters are those that have low variability. The following characters were used in species descriptions (although not all are found to be diagnostic in species decisions):

1. Size

(a) Length - measurements of the length of the elytra are taken from the anterior margin to the posterior edge (extremity).

(b) Width - the width is measured at the widest part of both elytra.

(c) Humeral width - the humeral crest (area) is measured at its broadest part.

In some species there is considerable variation in size, while in others the variation is very constant and almost non-existent.

2. Antennae

(a) Antennal segments 4-10 or 5-10 are serrate (*i.e.* short with the front angles of each much prolonged).

(b) Antennal segment ratios. The length of segment 3 is equal to the sum of the lengths of segments 4 and 5, or $3>4+5$, or $3<4+5$. (three types of Kleine (1937)).

(c) The antennae may be sparsely or densely setose.

(d) Antennal segment 11 elongated and much longer than segment 10, or short and stout.

Relative lengths of antennal segments are used in descriptions of species to differentiate between closely related species. According to Kleine (1937) there are mainly three types of antennae found in *Lycus*, but I have found these differences too weak to be of real significance in a key.

3. Head

The frons is depressed above antennal insertions (sockets), below the frontal bulge, bearing two pits. The depression, as well as the pits, vary from shallow to very deep.

4. Rostrum (Fig. 8A & B).

Measurements of the length of the beak (rostrum) are taken from the anterior margin of the eyes to the apex of the labrum.

(a) Rostrum long and slender (as in *inornatus* Bourgeois).

(b) Rostrum short and stout (as in *obtusus* Kleine).

The ratio between the length of the rostrum and the distance between the eyes provides a convenient means of comparison of the rostral structure (Green (1949)). According to Linsley *et al.* (1961) the only difference between the sibling species of *L. simulans* (Schaeffer) and *L. loripes* (Chevrolat) is that *simulans* has a shorter rostrum (associated with antennal proportions and the form of the maxillary palpi).

5. Maxillary Palpi

The maxillary palpi vary from:

(a) long and slender to

(b) relatively short and stout.

There is also variation in the form of the apical segment. According to Green (1949) a short rostrum is associated with comparatively stout maxillary palpi and a longer rostrum with slender palpi. The labial palpi vary form relatively long and slender to short and stout (but not as conspicuously as in the maxillary palpi).

6. Pronotum

(a) Colour - variable or very constant (as in *palliatus* (F.)).

(b) Form - variable in some species, constant in others.

The pronotum varies in form within species, but not the overall shape *i.e.* hood-shaped (as in *inornatus* Bourgeois), or more transverse (as in *duvivieri* Bourgeois).

(c) Length and width ratios - the length (x) and width (y) of the pronotum is quoted as a ratio. The pronotum is usually much wider than long.

7. Elytra

As previously mentioned a knowledge of all the colour variation is a necessary prerequisite if synonyms are to be exposed. The species *latissimus* (L.) is very variable in elytral form and colouration (Fig. 16), while the elytral form and colour variation is very constant in e.g. *palliatus* (F.) with the same

distribution pattern. This indicates that the taxonomical character value of colour differs inter-specifically. Mayr (1969) noted that there is no apparent reason why one species is highly variable and another not.

MALES

(a) The dilation of the elytra.

i. The dilation may occur along the whole lateral margin of the elytra as e.g. in *melanurus* Dalman;

ii. latero-anteriorly, e.g. *trabeatus* Guérin-Méneville;

iii. or on the latero-posterior (*integripennis* Bourgeois);

iv. or both (*humerosus* Fåhraeus);

v. or no dilation (elongated form) as in the subgenus *Haplolycus*.

(b) Spines on the elytra.

i. Lateral humeral spines; *i.e.* short and stout (*alatus* Kleine); or short and slender (*melanurus* Dalman) or long, slender and curved (*hamatus* Guérin-Méneville).

ii. Sutural spines; *i.e.* very long, slender and curved (*kolbei* Bourgeois).

(c) Humeral crests.

i. Enormous (*haagi* Bourgeois);

ii. or slight (*integripennis* Bourgeois).

Humeral crests may also vary greatly in form and maybe continuous with the lateral margins of the elytra.

(d) Extremities.

i. Truncate - smooth or spinose as in the subgenus *Acantholycus*.

ii. Rounded - all the other subgenera. (This may even vary within the same species e.g. *latissimus* (L.), or the form of the extremities may be constant as in *apicalis* Thomson.

(e) The form of the sutural margin *i.e.* straight or curved etc.

i. Straight (*hamatus* Guérin-Méneville etc.).

ii. Overlapping posteriorly (*elevatus* Guérin-Méneville).

iii. Distant (diverging) posteriorly (*duvivieri* Bourgeois etc.).

iv. Bloatation (swelling or hump) centrally (*alatus* Kleine).

(f) Epipleura.

i. Very large (*trabeatus* Guérin-Méneville).

ii. Hardly visible (subgenus *Haplolycus*).

iii. Turned up, "trough-shaped" (*elevatus* Guérin-Méneville).

(g) The elytra matt or glabrous.

In association with the elytra being matt, a species character is the edge of the elytra covered with a dense array of long setae (as in *haagi* Bourgeois).

(i) Costae and reticulate cells.

Usually there are four visible costae. The distinctness of the costae varies interspecifically, as well as the reticulate cells (between the costae) forming clear rows or simply a fine network.

Kleine (1937) noted that the form of the elytra is always a reliable character to recognize in spite of the great variation in colour (not applicable to *latissimus* (L.)).

According to Bocák and Bocákova (1990) the parallel elytra (as in the subgenus *Haplolycus*) represent the primitive form and the elytra with large latero-posterior dilations represents the derived form. The latter is often strongly modified as in the subgenus *Chlamydolycus*.

FEMALES

As previously mentioned, determination of the females is almost impossible because of the morphological analogy of several species (no sexual dimorphism).

(a) In the females the elytra are always elongated. Sometimes the females are difficult to place in a certain species, if not found in copulation, because of the overall similarity in form of the elytra.

(b) The colouration is similar to the males. If there is a great variation in colour in the males, the variation also occurs in the females.

(c) The form of the elytra in the females may also vary, not as much as in the males, but sometimes they may have a slight humeral crest or the elytra may be slightly dilated.

8. Abdomen (Fig. 8C & D).

The form of the penultimate and ultimate segments vary considerably interspecifically, with two distinct forms:

(a) Penultimate segment transverse, associated with a triangular, short and stout ultimate segment (as in *humerosus* Fåhraeus).

(b) Penultimate segment more or less subsquare, associated with very elongated, triangular ultimate segment (as in *inornatus* Kleine).

(c) Colour. (Usually not a very reliable character, but in some species very constant).

9. Legs

Sexual dimorphism occurs. All females have simple legs (no armature). Two types occur in the males:

(a) Simple.

(b) Toothed/dentate and thickened (see two groups of the subgenus *Merolycus*).

10. Aedeagus

a. Median lobe.

i. Simple - long, slender and pointed apically (*distanti* Bourgeois, *inornatus* Kleine etc.)

ii. Complex - long, curved and furcate apically (subgenus *Acantholycus*).

iii. Complex - short, stout and variously modified apically (e.g. *duvivieri* Bourgeois, *elevatus* Guérin-Méneville etc.).

b. Parameres.

i. Fused to median lobe, hardly distinguishable.

ii. Parameres free, but closely associated with the median lobe.

There is stability in size and shape of the median lobe, and between closely related species there is hardly any difference e.g. *inornatus* Kleine and *hamatus* Guérin-Méneville (they are distinguished by sexual dimorphic characters in the males). The aedeagus remains a useful taxonomic character, but not when trying to distinguish between closely related species (see the subgenus *Acantholycus*).

11. Scutellum

Found to be of no diagnostic taxonomic value at the species level.

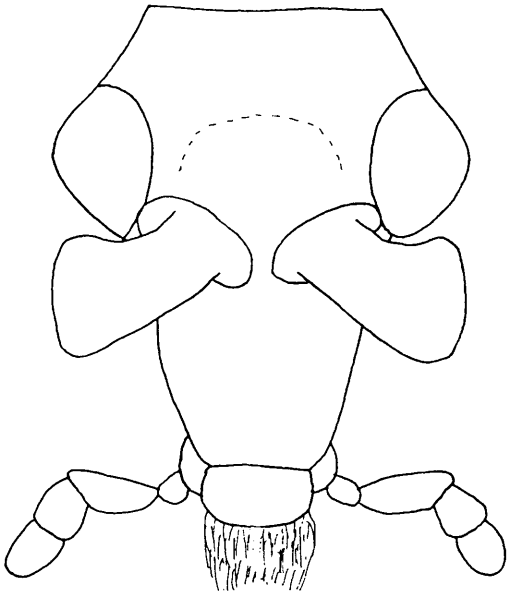
12. Female genitalia

Not considered because of the overall similarity interspecifically.

13. Geographical distribution pattern

(a) Widespread - e.g. Tropical and subtropical Africa.

(b) Constricted - e.g. endemic to southern Africa.



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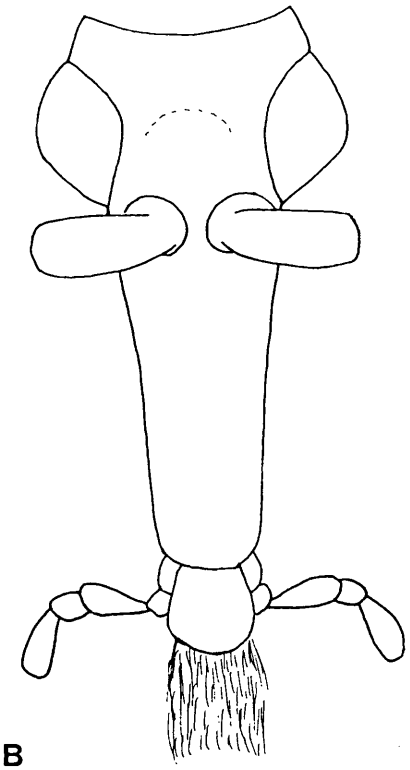

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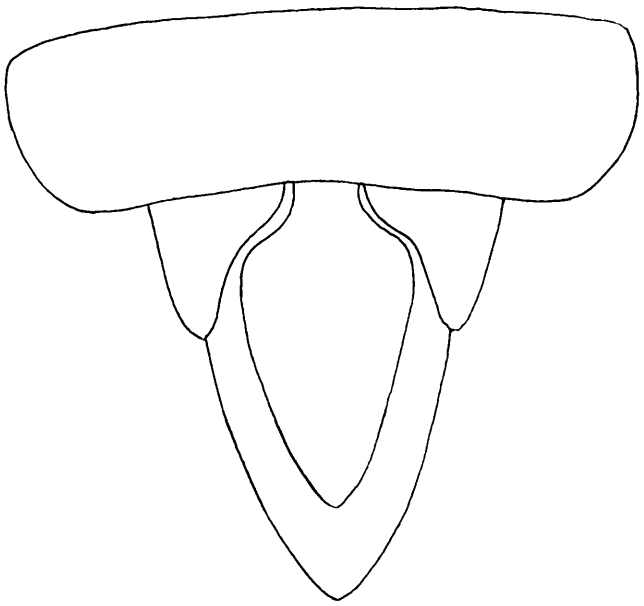

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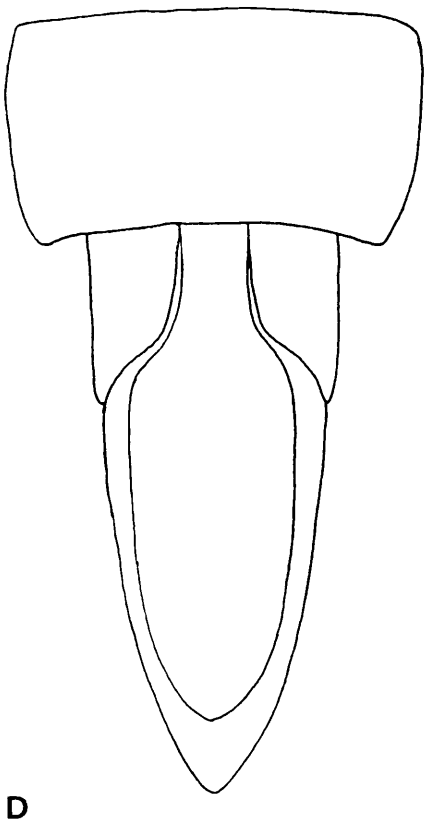


D

5.4 KEY TO THE SPECIES OF *LYCUS* F. (males only)

1 Legs broadened (thickened), femora and tibiae toothed (at least 1 pair of legs) **2**

\- All legs simple **7**

2(1) Forelegs broadened and toothed (femora and tibia); middle- and hindlegs simple **3**

\- Hind- and/or middlelegs broadened and toothed; forelegs simple **4**

3(2) Elytra elongated (sub-parallel); aedeagus as in Fig. 78A ..... ***chirindanus*** Kleine

\- Elytral sides broadly, dilated anteriorly (forming "wings"), posterior roundly dilated; aedeagus as in Fig. 78B .....***humerosus*** Fåhraeus

4(2) Hind- and middlelegs broadened and toothed (forelegs simple) **5**

\- Hindlegs broadened and toothed (fore- and middlelegs simple), elytra with slight humeral crests; slightly roundly, dilated latero-posteriorly, with extremities pointing inwards suturally; aedeagus as in Fig. 78C ..... ***podagricus*** Bourgeois

5(4) Elytra with dilated sides (semi-circular in form), with prominent humeral crests; aedeagus as in Fig. 78E ..... ***rostratus*** (L.)

\- Elytra elongated, without prominent humeral crests **6**

6(5) Elytra slightly broader apically, extremities rounded; distinct scutellar black markings; aedeagus as in Fig. 78D ..... ***rostratellus*** Bourgeois

\- Elytra with slightly rounded dilated latero-humeral margins; posterior slightly dilated, with ovally rounded extremities; aedeagus as in Fig. 78F ..... ***scapularis*** Murray

7(1) Elytra elongated (subparallel), without prominent humeral crest; elytra of males and females similar (no sexual dimorphism) **30**

\- Elytra of males and females dissimilar in form (sexually dimorphic characters), with/without prominent humeral crests and dilated laterally (varying in form) **8**

8(7) With humeral crest **9**

\- Without humeral crest **19**

9(8) Humeral crest spiniform 10

- Humeral crest not spiniform 11

10(9) Extremities truncate 12

- Extremities rounded 16

11(9) Elytra sides dilated medio-laterally 17

- Elytral sides dilated (sides rounded posteriorly); small humeral crests; aedeagus as in Fig. 32B .... *integripennis* Bourgeois

12(10) Extremities curved and prominently spiniform as in Fig. 9; elytra slightly dilated laterally; aedeagus as in Fig. 21A ..... *apicalis* Thomson

- Extremities truncate to rounded 13

13(12) Elytral sides broadly dilated, forming so-called "cheeks"; extremities truncate; costae prominent; texture not glabrous (matt); aedeagus as in Fig. 21C ..... *melanurus* Dalman

- Elytral sides not as broadly dilated (no so-called "cheeks") 14

14(13) Elytra colouration and truncature of extremities very variable; humeral spiniform sides parallel; aedeagus as in Fig. 21D ..... *latissimus* (L.)

- Elytra colouration relatively constant; humeral spiniform sides not parallel, slightly extended 15

15(14) Elytral extremities straight to rounded; aedeagus as in Fig. 21B ..... *corniger* Dalman

- Elytral extremities rounded; aedeagus as in Fig. 21E ..... *integer* Bourgeois

16(10) Elytra dilation more or less rounded; humeral crest small, bluntly spiniform; sutural margin straight; aedeagus as in Fig. 21F ..... *intermedius* Bourgeois

- Elytra transversely dilated; humeral crest produced, ending in a blunt, rounded incurved spine; sutural margin bloatated and overlapping medially, with posterior concave sutural margin .... *alatus* Kleine

17(11) Elytral lateral margin with an array of long dense and conspicuous setae 18

- Elytral lateral without setae 19

18(17) Humeral crests elongately dilated laterally; posterior 1/3 of elytra black ..... *haagi* Bourgeois

\- Humeral crests roundly dilated laterally; posterior 1/2 of elytra black, with black colouration extending medially to humeral area ..... *pusillus* Kleine

19(8) Elytra with extremely long and slender spines 20

\- Elytra without spines 21

20(19) Elytra with long, curved latero-humeral spines extending centrally ..... *hamatus* Guérin-Méneville

\- Elytra with long, curved sutural marginal spines ..... *kolbei* Bourgeois

21(19) Elytra with humeral calli ..... *inornatus* Bourgeois

\- Elytra without humeral calli 22

22(21) Elytra with anterior sides dilated and margins upturned (trough-shaped) 25

\- Elytra with sides dilated (rounded), margins not "trough-shaped" 23

23(22) Elytra sides ovally-rounded dilated 27

\- Elytra with distinct epipleura formed (elytra extended ventrally) 24

24(23) Elytra roundly dilated (varying from extremely to elongated) in anterior 3/4 with very large epipleura ventrally ; with "fingerprint-form" black marks on elongated posterior extremities; aedeagus as in Fig. 61D ..... *trabeatus* Guérin-Méneville

* Elytra with "fingerprint" black apical markings; form of elytra long and slender; aedeagus as in Fig. 61E ..... *trabeatus* Guérin-Méneville (see discussion pg. 152).

\- Elytra not as broadly dilated (elongated), with slight ventral epipleura; transverse black apical markings (margin straight); aedeagus as in Fig. 61C ..... *subtrabeatus* Bourgeois

25(24) Elytra with humeral area concavely hollow; posterior elongated, extremities ovally pointed, medially; aedeagus as in Fig. 61A ..... *distanti* Bourgeois

\- Elytra with humeral areas not concavely hollow; extremities pointed ventrally and ovally rounded 26

26(25) Elytra with anterior sides extremely dilated; sutural margin straight ..... *poultoni* Bourgeois

- Elytra with anterior sides slightly dilated, posterior margin of "trough" slightly extended, forming a rounded, blunt protrusion; sutural margin convexly overlapping medially .... *elevatus* Guérin-Méneville

27(23) Elytra slightly depressed dorso-ventrally; sutural margin slightly convex, overlapping medially with posterior extremities widely apart; aedeagus as in Fig. 50B ..... *duvivieri* Bourgeois

- Elytra not depressed dorso-ventrally; sutural margin not convex; extremities not widely separated 28

28(27) Elytra extremely dilated laterally (transverse rounded form) sutural margins slightly concave medially; aedeagus as in Fig. 50E ..... *foliaceus* Dalman

- Elytra not as extremely dilated; sutural margin relatively straight 29

29(28) Posterior margin of pronotum with distinct black band, extending medially; sutural margin "bloatated" medially; aedeagus as in Fig. 51D ..... *palliatus* (F.)

- Pronotum with black markings medially (no black band on posterior margin); aedeagus as in Fig. 50B ..... *ampliatus* Fåhraeus

30(7) Elytra with slight humeral crest and distinct black, humero-scutellar area (anterior 1/5); aedeagus as in Fig. 32E ..... *zonatus* Fåhraeus

- Elytra without slight humeral crest; no black humeral area 31

31(30) Elytra slightly dilated laterally (ovally-elongated form); black posterior 1/5 of elytra; aedeagus as in Fig. 32D ..... *staudingeri* Bourgeois

- Elytra completely elongated (not dilated laterally); aedeagus not as in Fig. 32D 32

32(3) Elytra very elongated with prominent costae; aedeagus as in Fig. 66A .... *agrestis* Bourgeois

- Elytra elongated; apical 1/5 black; aedeagus as in Fig. 66B ..... *scrobicollis* Fåhraeus

5.5 DESCRIPTION AND DISCUSSION OF THE SPECIES

5.5.1 Species of the subgenus *Acantholycus*

Lycus (Acantholycus) apicalis Thomson

(Figs 9, 10 & 21A)

Lycus apicalis Thomson, 1858: 77♀; Bourgeois 1878: 165; Bourgeois 1889a: 225; Bourgeois 1901: 36; Pic 1927: 41 (v. *reductus*); Kleine 1933: 11; Kleine 1937: 63.

seminiger Kolbe, 1883: 21♀; Kolbe 1887: 280; Bourgeois 1889a: 225.

TYPE: No type traced. (According to Thomson (1858) in the Coll. de Mniszech).

Redescription

MALE.

Size: length 13,0-15,0 mm; width 8,5-9,5 mm (Bourgeois 1878).

Only one male specimen examined: length 14,5 mm; hum. width. 5,0 mm; width 8,0 mm.

Head: transversely depressed between eyes, forming two deep pits.

Rostrum: long and slender; 2,10X distance between eyes.

Colouration: antennae, head, mesal part of pronotum and abdomen, scutellum, scutellar area, legs and posterior 1/2 of elytra black; rest of elytra, pronotum and abdomen ochraceous (Fig. 9).

Pronotum: broader than long, 1:1,55-1,70; subrectangular with antero-lateral angles obtusely rounded; anterior angle obtuse, ridged and protruding; posterior angles acute; sides slightly reflexed.

Elytra: dilated laterally, from humeral area to middle of lateral margin, suboval; truncate and spiniform at extremities, spiniform humeral crests (more or less 1/5 of length of elytra), run parallel to each other and spiniform; sutural margin straight, slightly convex and overlapping posteriorly; four visible costae, 2nd prominent, 3rd indistinct (disappearing in humeral area), with irregular reticulate network between costae; elytra and pronotum virtually glabrous (Fig. 9).

Abdomen: penultimate segment transverse, posterior part concavely arched, with sides protruding; last segment triangular.

Legs: simple.

Male genitalia: parameres closely fused to median lobe; median lobe roundly furcate apically (Fig. 21A).

FEMALE.

Size of holotype according to Thomson (1858): length 14,0 mm; width 7,0 mm.

Size: length 11,0-15,0 mm, width 5,0-7,0 mm.

Rostrum: long and slender; 1,90 - 2,40X distance between eyes.

Antennae: moderately setose, compressed; 5-10 serrate; $3>4+5$; $10<11$.

Maxillary palpi: relatively stout; last segment distinctly broader and depressed apically.

Elytra: suboval, elongated and less dilated laterally (than in male), otherwise similar, except for lack of a humeral spine and spiniform, truncate extremities; colouration similar to male.

Discussion

Thomson's (1858), description of *apicalis* was based on a single female specimen. He noted that this species was very similar to *terminatus* Dalman, but differs in form of elytra being more slender and the colouration more black. Kolbe (1883) described a new species *seminiger* (based on a female specimen) which Bourgeois (1889) synonymized. According to Bourgeois (1889) the type specimen is in the Berlin Museum (which I could not locate). Pic (1927) described a variation from Cameroun, namely *reductus* (with a slight elytral colour and form difference). Kleine (1937) could also not locate the type specimen and therefore followed the literature. He noted that this is a widespread species.

In the only male specimen examined, the antennae and mouthparts were incomplete. With only 12 specimens examined (one male) no clear diagnosis could be made.

Material examined

12 specimens examined (1 male and 11 females).

CAMEROUN: Mukonje Farm (2 ISNB). GABON: Riv. N'Gounie (3 ISNB). ZAIRE: Eala (2 MRAC). Ilenge (1 MRAC). Likimi: Gumba (2 ISNB). Stanleyville (2 ISNB).

Geographical distribution (Fig. 10)

Cameroun, Congo, Equatorial Gabon, Guinea, Mozambique and Zaire.

Diagnosis

Relatively small species, with definite truncate, spiniform extremities in the elytra. Similar to *L. latissimus* (L.), but differing in the elytra not as dilated laterally (more oval), and the apical black colouring and aedeagus very specific. The apical truncature is also more curved than in *latissimus* (due to the sutural spines being more prominent).

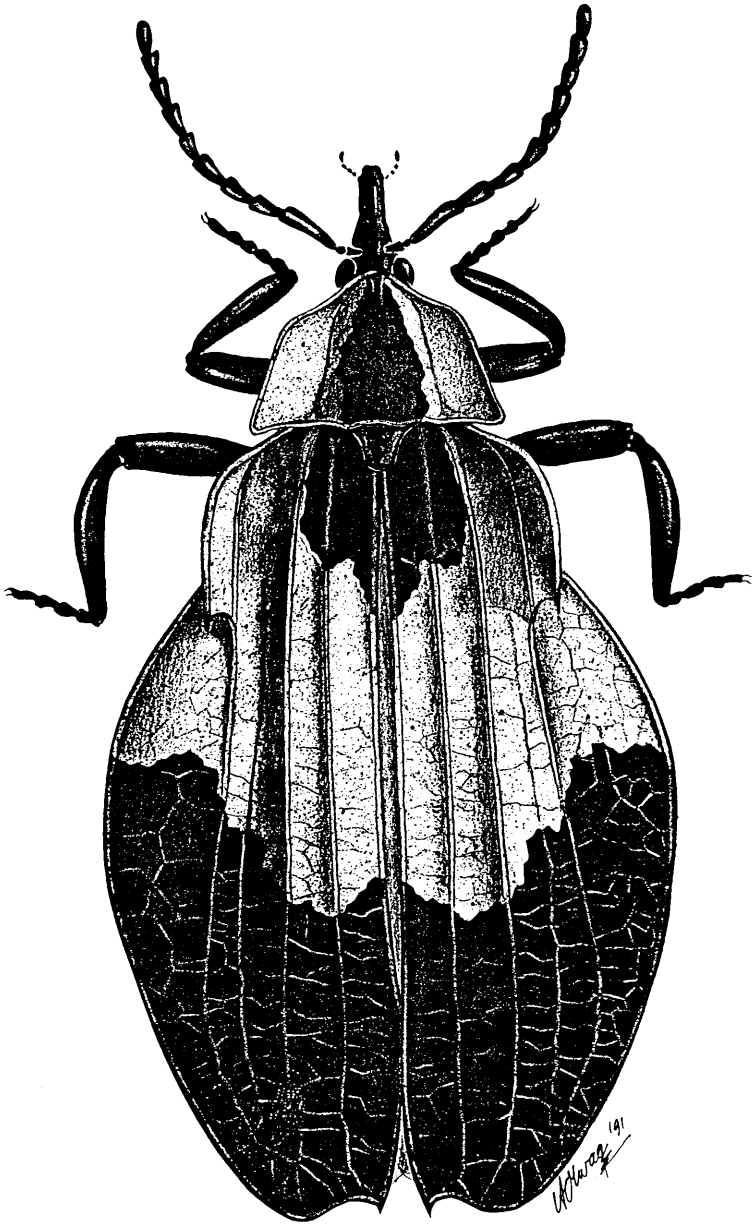
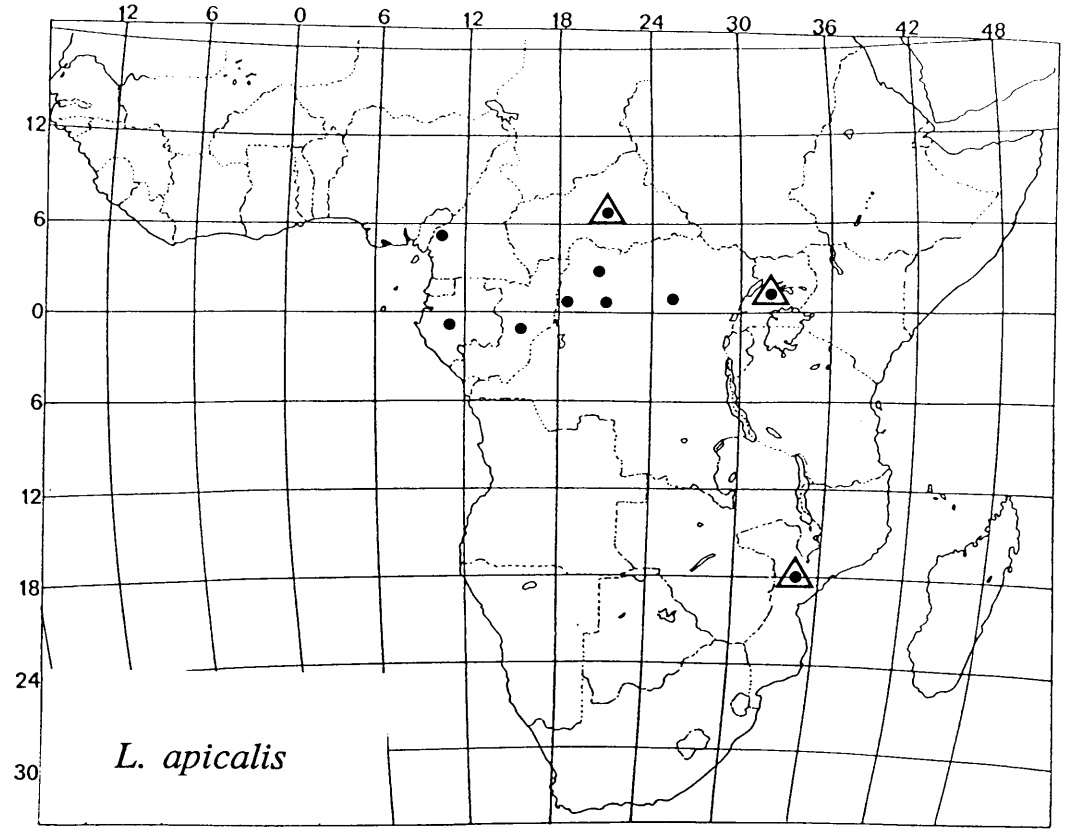


Figure 9: *Lycus (Acantholycus) apicalis* Thomson.



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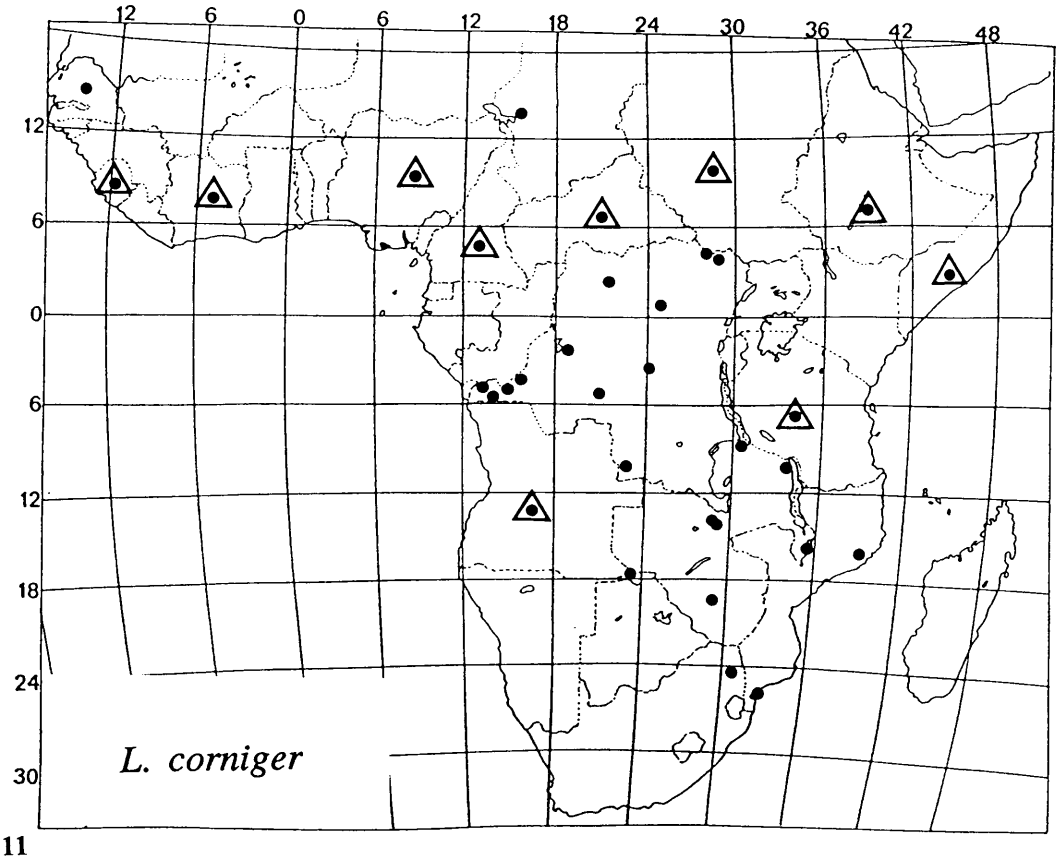

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Figures 10 & 11: - 10 Distribution of *Lycus apicalis*. - **11** Distribution of *Lycus corniger*.

Lycus (Acantholycus) corniger Dalman

(Figs 11, 12 & 21B)

Lycus corniger Dalman, 1817: 25; Bourgeois 1889b: 239; 1901: 36; 1908c: 106; Kleine 1933: 7; 1937: 65; Gomes-Alves 1959: 110.

subcostatus Murray, 1868: 327♀; Waterhouse 1879: 18o.

terminatus Dalman, 1817: 29 ♀; Bourgeois 1901: 36 (v. *integer*); Kleine 1933: 7 **syn.nov.**

TYPES: *L. corniger* HT (male): Sierra Leone, Afzelius; 160/89; (NHRS).

L. terminatus HT (female), Sierra Leone, Afzelius; 165/89; (NHRS).

Redescription

MALE

Size: length 10,0-17,5 mm; hum. width 4,5-8,5 mm; width 8,0-12,0 mm.

Head: transversely depressed between eyes forming two deep pits.

Rostrum: long and slender; 1,95-2,60X distance between eyes.

Antennae: moderately setose, compressed; 4-10 serrate; $3>4+5;11<10$.

Maxillary palpi: relatively slender with apical segment slender and depressed apically.

Colouration: antennae, head, scutellum, mesal part of pronotum and abdomen (varying from black mesally to part of penultimate and ultimate segment black) and posterior part of elytra (1/3-1/4) black; rest of elytra, pronotum and abdomen ochraceous (Fig. 12).

Pronotum: broader than long, 1:1,40-1,70; anterior angles scalloped and obtuse, anterior ridged, hardly protruding; posterior angles acute, pointed and reflexed; sides slightly reflexed.

Elytra: slight humeral crests with associated, well developed, slightly extended humeral spines; sides dilated posteriorly from humeral crests, till about 1/2 way down; extremities not truncate, rounded to straight, with/without acutely pointed sutural angles (spiniform appearance); posterior black area with dentate margin, extending concavely mesally towards sutural margin; sutural margin straight, slightly convex (overlapping) posteriorly; four visible costae, 2nd prominent; 1st and 4th distinct, 3rd hardly visible; reticulate cells indistinct, 1 row between sutural margin and costa 1 and between 2, 3 and 4; 2 rows between costae 1 and 2 (Fig. 12).

Abdomen: penultimate segment transverse, arched (concavely rounded) posteriorly; last segment triangular.

Legs: simple

Male genitalia: parameres closely fused to median lobe, but visible; median lobe furcate with ventral lobe thicker, dorsal lobe extended and pointed apically (slanting forward) (Fig. 21B).

FEMALE

Size: length 11,0-18,0 mm; width 6,5-10,5 mm.

Colouration: similar to male, elytra elongated, rounded at extremities; no humeral spine, only a slight humeral crest; 2nd costa prominent.

Discussion

Dalman (1817) described both species *L. corniger* and *L. terminatus* (see later) from Sierra Leone. The species *terminatus* was described from a female specimen. Both species have the same distribution range and have very similar elytral and aedeagal form (except the synonym *L. integer* Bourgeois - discussed later).

Bourgeois (1901) noted that *corniger* and *terminatus* are two very similar species. In *corniger* the 2nd elytral costa is much more prominent than the first, while in *terminatus* costae 1 and 2 are similar. In *corniger*, the abdomen of the male is black with sides ochraceous, and in the female entirely black. In *terminatus* the abdomen is entirely ochraceous, except for the last segment black in the male (black markings in the female). In the holotype (female *terminatus* Dalman) the 2nd costa also seems more prominent than the 1st as well as the abdominal colouration similar, which is similar to *corniger* . These two species are considered to be synonyms.

Lycus corniger also resembles *melanurus* Dalman, but differs by the colouration of the elytra noticeably lighter, the black pattern differing (*melanurus* also more glabrous). The elytra form ("cheeks" / dilation), colouration and aedeagal form of *L. melanurus* differs consistently from *L. corniger*.

From the diagrammatical representation of Kleine (1937) and all the specimens examined, no "truncate spiniform" extremities (which is characteristic of the subgenus *Acantholycus*), could be found, although the extremities may vary to slightly square (and spiniform). Marie (1968) determined material and placed *corniger* in the subgenus *Hololycus*. This species seems to be very variable when considering the form of the elytral extremities (similar to the species *L. latissimus* (L.)).

Murray (1868) described a species *subcostatus* from "Old Calabar", based on a female specimen, which was synonymized by Bourgeois (1889).

Three specimens were examined from (ISNB) with "type" labels and det. labels, but are not considered valid (1 from Senegal, and 2 with no locality).

Material examined

109 specimens examined.

CHAD: Lake Tchad basin (2 MNHN). CONGO: Haute Sanga (1 MNHN). ETHIOPIA: (3 MNHN); Shoa Prov: S Shore of Lake Langana (4 MRAC). IVORY COAST: Assinie (5 MNHN). MALAWI: Chilumba (1 UPSA); "Nyasaland" Mlanje (8 BMNH); Mt. Mlanje (1 UPSA); MOZAMBIQUE: Inhaca Island (1 TMSA); NAMIBIA: Kwandu Riv., W Caprivi (1 UPSA). NIGERIA: (4 ISNB). SENEGAL: Reg. Casamance (1 ISNB). SOMALIA: (6 MNHN 1 SAMC). SOUTH AFRICA: CP. Hogsback (1 SAMC); Jonkersberg (1 TMSA); Port St. Johns (1 TMSA); NAT. Durban (1 SANC); Empangeni (1 UPSA); Empangeni, Nyala Park (1 TMSA); Malvern (1 SAMC; 2 SANC); Umkomaas (1 SANC); TVL. Lydenburg (1 TMSA). Newington (3 TMSA). SUDAN: (2 MNHN). TANZANIA: Bagamoyo (1 ISNB). ZAIRE: (8 MNHN); Azande (2 ISNB); Bambesa (2 MRAC); Faradje, Mala (1 ISNB); Foret de Kawa (1 ISNB); Inongo (1 ISNB); Isangi (1 ISNB); Kafakumba (1 MRAC); Kasai, Djeka (2 MRAC); Leopoldville (1 ISNB); Likimi (1 ISNB); Likimi, Mumbia (1 ISNB); Lukengu (1 ISNB); Mayidi (2 MRAC); Quemba (1 ISNB); Stanleyville (2 ISNB). ZAMBIA: Abercorn (4 TMSA); Kashitu, N Broken Hill (12 BMNH); Zambeze (2 MNHN). ZIMBABWE: Bulawayo (1 TMSA); Mt. Selinda (1 TMSA); Umtali (1 SAMC).

No locality (2 ISNB).

Geographical distribution (Fig. 11)

Angola, Chad, Congo, Ethiopia, Ivory Coast, Malawi, Mozambique, Namibia, Nigeria, Senegal, Sierra Leone, Somalia, South Africa (Cape, Natal, Tvl), Sudan, Tanzania, Zaire, Zambia and Zimbabwe.

Diagnosis

This species may be distinguished by the form of the aedeagus. The elytral extremities are very variable, but the overall form and black posterior colouration is very constant.

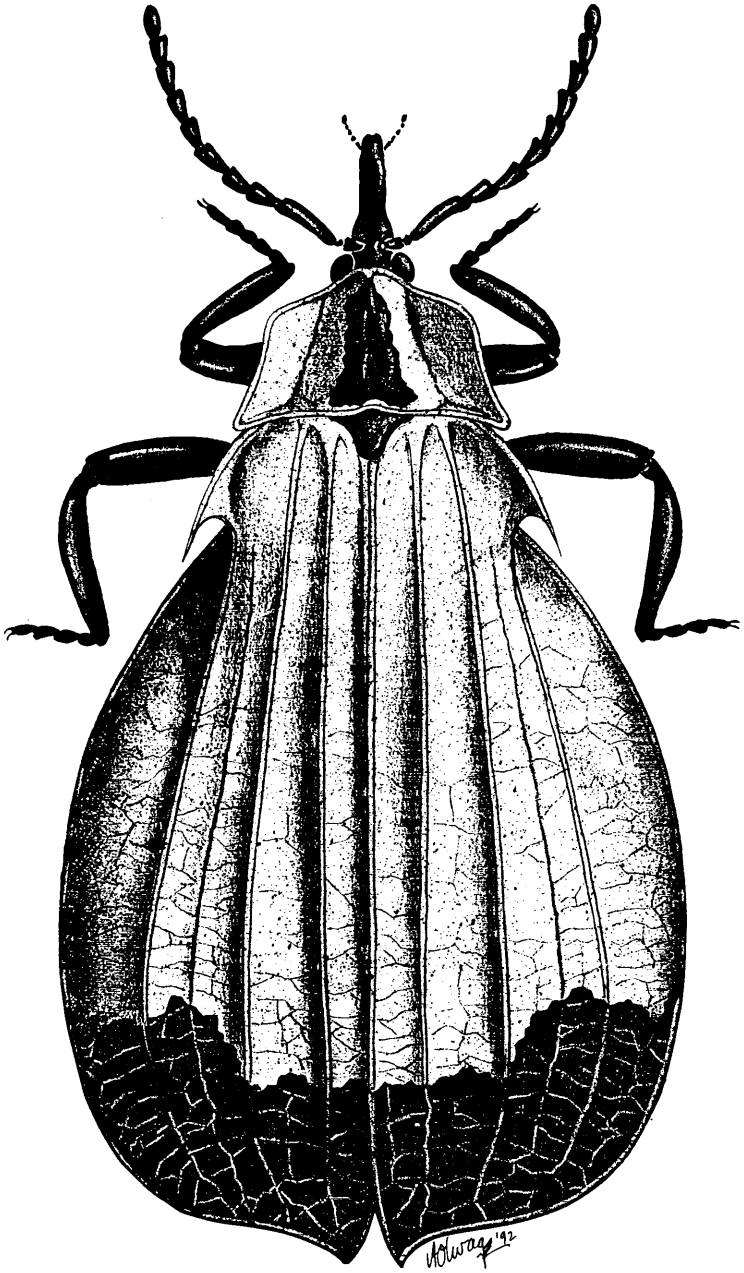


Figure 12: *Lycus (Acantholycus) corniger* Dalman.

Lycus (Acantholycus) integer Bourgeois

(Figs 13 & 21E)

Lycus integer Bourgeois, 1900: 140; 1901: 36 (v. *integer*); Kleine 1937: 71 (*terminatus*); Gomes-Alves 1952: 11; 1962: 42; 1978: 12 (*terminatus*).

TYPE: HT (male); Congo belge, Moliro, J. Duvivier; det. Bourgeois 1900, *L. integer* Bourg. sp.nov. 9 paratypes and 1 allotype with the same information. 2 paratypes with the same information but Albertville (not Moliro), all from (ISNB).

Redescription

MALE

Size: length 13,5-17,0 mm; hum. width 5,0 mm; width 8,0-9,0 mm.

Head: transversely depressed between eyes forming two deep pits.

Rostrum: very long and slender; 2,10-2,38X distance between eyes.

Antennae: 4-10 serrate; 3>4+5; 10< 11.

Maxillary palpi: relatively long and slender with apical segment broadly elongated.

Colouration: head, antennae, scutellum, mesal part of pronotum, penultimate and last abdominal segment, and posterior 1/4 of elytra black; rest of thorax, abdomen and elytra ochraceous.

Pronotum: broader than long 1:1.49-1,63; anterior and front angles obtuse, anterior form semicircular-scalloped, anterior margin ridged mesally; posterior angles acute and reflexed.

Elytra: slight humeral crests, spiniform; lateral sides slightly dilated, with extremities ovally rounded; four visible costae, with 1st and 2nd costae prominent, 4th visible and 3 indistinct.

Abdomen: penultimate segment arched posteriorly, last segment triangular.

Legs: simple.

Male genitalia: parameres clearly visible, closely associated with median lobe; median lobe extended, curved and pointed apically, ventrally thickened (Fig. 21E)

FEMALE

Size: length 12,0-14,0 mm; width 6,0-7,0 mm.

The form of elytra more elongated than in the male. Colouration similar.

Discussion

This species was described by Bourgeois (1900) from Zaire, and synonymized with *L. terminatus* Dalman (considered a variation) by Bourgeois (1901).

After examining type specimens it was noted that the aedeagus of *integer* was very different from *L. terminatus* (which is synonymized with *L. corniger* Dalman as mentioned earlier). The species *L. integer* should retain its species status as in Bourgeois (1900).

Later authors *i.e.* Kleine (1937) and Gomes-Alves (1952, 1962, 1978), seemed to be confused, describing and illustrating the aedeagus of *L. integer*, mistaking it for *terminatus* Dalman. This can be understood because as previously mentioned, *L. terminatus* was described from a female specimen, and all later authors followed Bourgeois (1901).

From only the few specimens examined, this species seems to be very constant in elytral form and colouration.

Material examined

33 specimens examined.

MALAWI: "Nyasaland" Mlanje (8 BMNH). ZAMBIA: Kashitu, N of Broken Hill (12 BMNH).

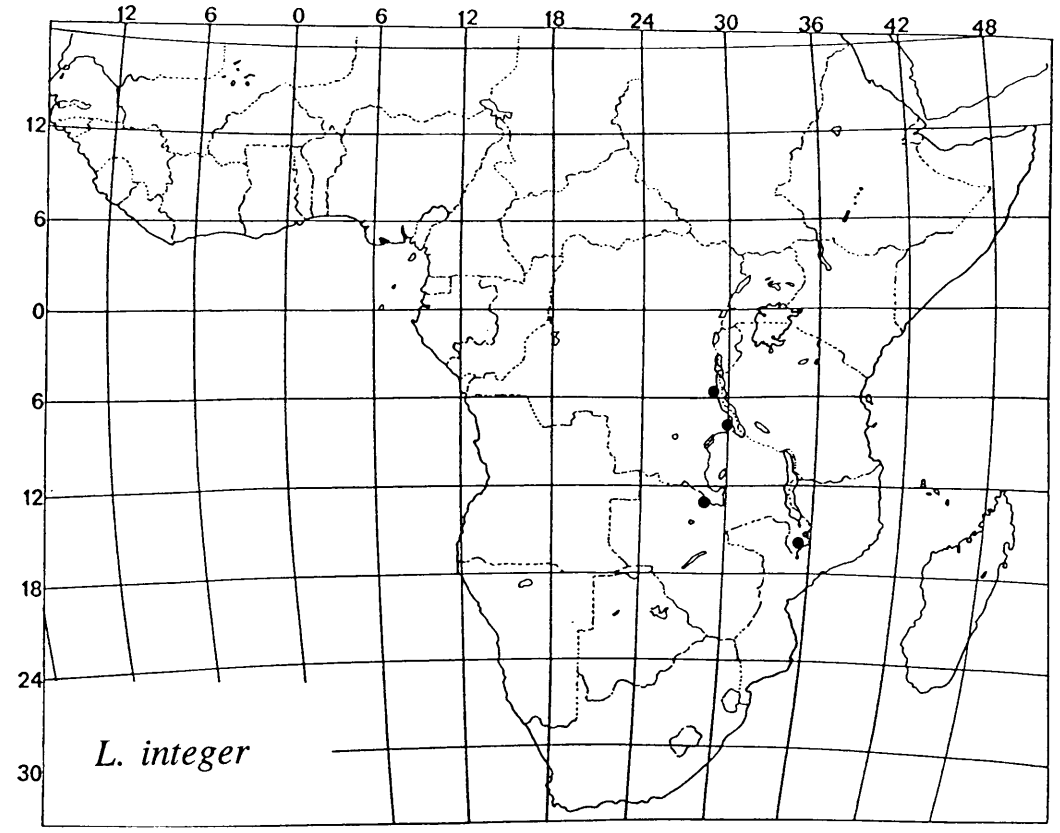
Geographical distribution (Fig. 13)

Malawi, Zaire and Zambia.

This species does not occur in the studied subregion, but because of it being synonymized up to now with *L. terminatus* it was included.

Diagnosis

This species is diagnosed by the form of the elytral extremities (ovally rounded) and the characteristic form of the male genitalia.



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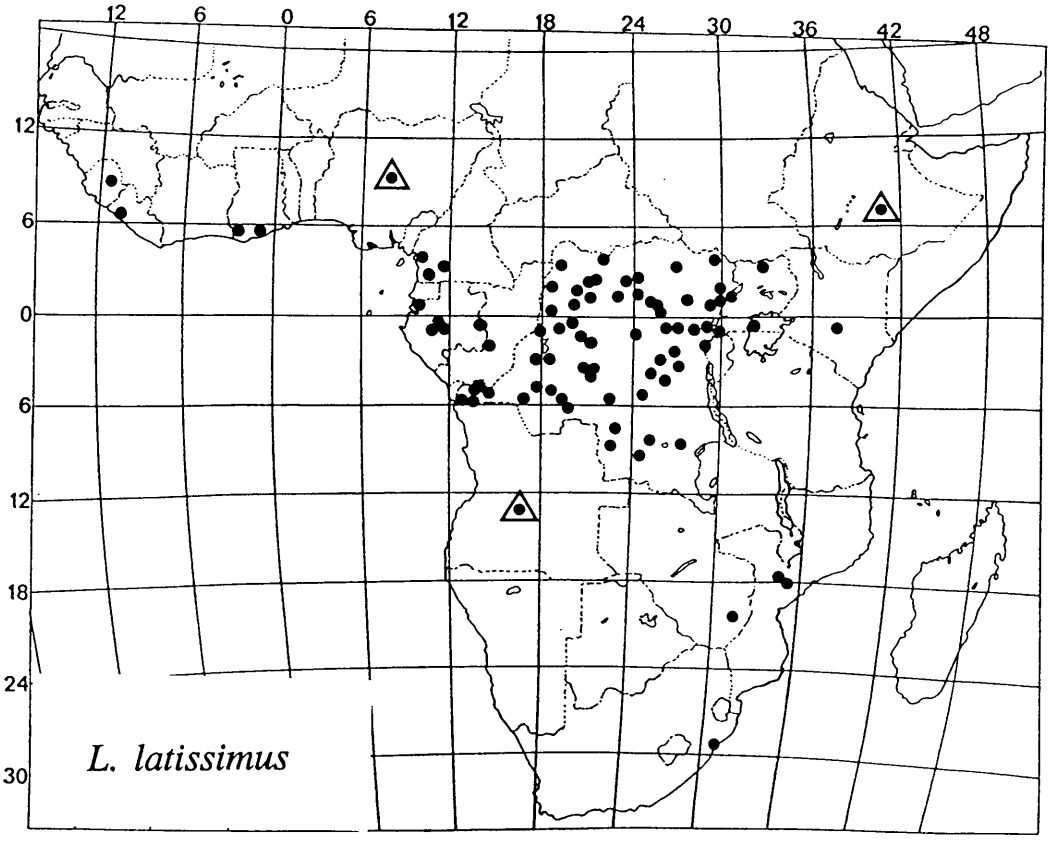

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Figure 13 & 14: -13 Distribution of *Lycus integer*. **-14** Distribution of *Lycus latissimus*.

Lycus (Acantholycus) latissimus (L.)

(Figs 14, 15, 16 & 21D)

Lampyris latissimus L., 1767: 646.

Pyrochroa latissimus: F. 1775: 203.

Lycus latissimus: F. 1787: 163; Oliver 1790: 5; Dalman 1817: 27; Guérin-Méneville 1847: 227; Waterhouse 1879: 19; Bourgeois 1889b: 237; 1899: 658 (v. *mocquerysi*); 1900: 140 (v. *decoloratus*); 1901: 33; Pic 1925a: 2; 1926: 124; 1933a: 116 (v. *binotatus*, v. *luteohumeralis*); Kleine 1937: 68; 1933: 7; Gomes-Alves 1947: 50; 1956: 215; 1962: 42; 1978: 14.

praemorsus Dalman, 1817: 25; Murray 1868: 330, 331 (v. *fenestratus*, v. *subdenticulatus*); Bourgeois 1880b: 2; 1883a: 59; 1889b: 237 (v. *lateralis*).

lateritius Thomson, 1858: 78.

harpargo Thomson, 1858: 76; Murray 1868: 330; Marie 1968: 342.

elegans Murray, 1868: 332♀; Waterhouse 1879: 19; Bourgeois 1880b: 2; 1889b: 238 (v. *intermedia*); 1900: 139 (v *basalaris* and *suturalis*); 1901: 34 (v. *posticolis*); 1905: 189; Pic 1925a: 2; 1926: 123-124 (v. *ornatus*, *intermedius*, *leveillei*); Kleine 1933: 7; 1937: 66; Gomes-Alves 1967: 46. **syn. nov.**

leveillei Bourgeois 1877: 363; Kolbe 1887: 281. **syn. nov.**

modestus Gahan 1909: 202; Pic 1925b: 184 (v. *reducteapicalis*) Kleine 1933: 7; 1935a: 102; 1937: 69. **syn. nov.**

TYPES: *L. praemorsus* HT (male): Sierra Leone, Afzelius; 159/89; (NHRS).

L. modestus PLT (female) (new designation): syntype; E. Ruwenzori, 6-13,000ft., 3.I.1906; coll. by H.G. Legge & A.F.R. Wollaston; (BMNH).

L. elegans PLT (female) (new designation): syntype; Old Calabar 78.19; (BMNH).

Redescription

MALE

Size: length 15,0-23,0 mm; hum. width 4,0-5,5 mm; width 8,5-17,0 mm.

Head: transversely depressed between eyes, forming two distinct, deep pits.

Rostrum: long and slender; 2,10-2,45X distance between eyes.

Antennae: 4-10 serrate; 3=4+5; 11<10.

Maxillary palpi: long and slender with apical segment broadly flattened.

Colouration: head, antennae, legs and mesal part of pronotum black; elytra varying in black markings (Fig. 16); abdomen varying from completely black to mesal part of penultimate and last segment black; rest of pronotum, abdomen and elytra ochraceous (Figs 15 & 16).

Pronotum: broader than long; 1:1,45-1,65; posterior angles acutely reflexed, latero-anterior angles and anterior angle obtusely rounded; anterior slightly protruding.

Elytra: form and colouration very variable (Fig. 16), sides dilated to a varying degree, extremities varying from truncate to straight to slightly rounded, may or may not be spiniform; humeral crests spiniform (about 1/5 of length of elytra, extending parallel to elytral side); 4 visible costae, with 3rd indistinct; irregular rows of reticulate cells between costae; sutural margin varying (from straight to convexly extending (*i.e.* overlapping) mesad of sutural margin posteriorly) (Fig. 15).

Abdomen: penultimate segment curved posteriorly with sides protruding, last segment triangular.

Legs: simple.

Male genitalia: parameres closely fused, hardly visible; median lobe furcate apically with dorsal lobe curved, pointing downwards, slightly longer than broad; ventral lobe pointed (Fig 21D).

FEMALE

Size: length 16,0-24,0 mm; width 6,0-10,5 mm.

The elytra are similar in colouration to male, but are not as dilated, more ovally elongated. Extremities ovally-rounded.

Discussion

The "Linnaeus types" could not be located. Only 3 type specimens could be traced. All the other "types" traced are not considered to be valid (most are "types" of variations). In previous publication cited, many "*latissimus*" synonyms were recorded. These are considered redescriptions of the original species described by Linnaeus under the genus *Lampyris*.

This is a very interesting species, in that it is a good example of the variation possibilities that exist in the genus *Lycus* (Fig. 16). No other species in this genus displays such enormous variation. This can be seen from the numerous synonyms and variations described and listed.

According to Kleine (1937) and Gomes-Alves (1962) *latissimus* (L.), *elegans* Murray and *modestus* Gahan have the same geographical distribution as well as the same aedeagus form. A large variation in elytral colour and form exist. The truncation of the extremities is also very variable (including all possible forms from truncate to rounded). The species *L. elegans* and *L. modestus* are considered to be transitional forms of *latissimus*, and do not represent geographical races and have therefore been synonymized.

This species is very similar to *L. melanurus* Dalman, but the elytra are not as dilated laterally (more oval in form). The spiniform humeral crests also differ, not as extended as in *melanurus* (similar in form to *L. apicalis* Thomson). The colouration and aedeagus is also completely different.

According to Gomes-Alves (1978) a host plant is: *Coffea robusta*.

Material examined

422 specimens examined.

AFRICA: (2 ISNB). ANGOLA: (1 SANC). CAMEROUN: (1 MRAC;1 SAMC;2 SANC;1 TMSA); "Ariq Occid Johann-Alberts Hohe Station" (8 MNHN); Ebogo (1 MRAC); Lolodorf (1 MNHN); Mukonje Farm (33 ISNB). CONGO: Haute Sanga (3 MNHN); Libreville (3 MNHN); Oubangui (1 MNHN); Riv Benito (4 MNHN) GABON: (1 ISNB;10 MNHN;5 TMSA); Franceville (3 MNHN); Lambaréné (2 MNHN); L. Laglalzer (1 MNHN); Londoma (1 MNHN); Oyam (2 MNHN); Riv N'Gounie (44 ISNB); Samkila (1 MNHN). GHANA: Takoradi (2 MRAC); Colony Enchi (1 TMSA). IVORY COAST: "Assinie" (3 MNHN); Sanwit (1 ISNB). LIBERIA: Monrovia (2 MNHN). MOZAMBIQUE: Canxixe (1 MNHN); Chemba (1 MNHN). NIGERIA: "Old Calabar" (1 ISNB; 2 SAMC). SENEGAL: (1 ISNB). SIERRA LEONE: (1 ISNB). Kokero (1 SANC); Rhohomp (3 ISNB). TANZANIA: Ukamo (2 MNHN). UGANDA: (1 MNHN). Entebbe (1 MNHN); Sese-Islands (1 MNHN). ZAIRE: (4 ISNB; 10 MNHN). Aruwimi, Panga (2 MRAC); Azande, Niam-Niam (14 ISNB); Banga (1 ISNB); Bas Congo, Lemfu (1 MRAC); Bas Congo, Mangembo (1 MRAC); Blukwa (1 ISNB); Boma (1 ISNB); Boma Banana (5 ISNB); Boma Sundi (1 ISNB); Bombe (1 ISNB); Buhunde, Okondo (2 ISNB); Buhunde, Sundi (1 ISNB); Buhunde, Uluku (1 ISNB); Chiloango (2 ISNB); Djugu (Mczi) (2 ISNB); Faradje Gaduma Maia (3 ISNB); Genge (1 ISNB); Grand Lahou (1 MNHN); Haute Hele, Moto (1 MRAC); Haute Congo (1 ISNB); Haute Maringa (1 ISNB); Kakolo (1 ISNB); Kasai, Lula Terr. Luisa (1 MRAC); Kasango, Stanleyfalls (8 ISNB); Kelemlo (1 ISNB); Kemba (1 ISNB); Kibali-Ituri: Epulu Terr. Wamba (1 MRAC); Kikinga (1 ISNB); Kimuela (1 ISNB); Kinganga (1 ISNB); Kinshasa & Coquilhatville (1 ISNB); Kivu, Buseregenye (1 MRAC); Kivu, Tshibinda (1 MRAC); Kawa (2 ISNB); Lelo, Sundi (1 ISNB); Lese (1 MRAC); Libenge, Ubaengi (Oubangui) (2 ISNB); Libenia (1 ISNB); Likimi (21 ISNB); Likimi, Bosanga (1 ISNB); Likimi, Kawa (1 ISNB); Likimi Mumbia (2 ISNB); Lingunda (1 ISNB); Lubutu (5 ISNB); Lubutu, Masua (3 ISNB); Lubutu, Utike (2 ISNB); Luebo (1 MRAC); Luki (1 ISNB); Lukengu (5 ISNB); Lulua, Kapanga (3 MRAC); Lulouabourg (1 ISNB); Matadi (2 ISNB); Mayidi (1 MRAC); Mayombe Ganda (1 ISNB); Mayombe (2 ISNB); Mayombe Kimuela (12 ISNB); Mt. Congo (1 ISNB); Mt. Ruwenzori (1 MNHN; 1 MRAC); Ngele Eala (1 MRAC); Oluku (1 ISNB); Region de Sassa (1 MRAC); Region du Bas-Uele (2 ISNB); Rutshuru (2 ISNB); Sanzulu (5 ISNB); Seka Banga (1 ISNB); Seka (1 MRAC); Semliki: Mutwanga (1 MRAC); Stanleyfalls (9 ISNB);

Stanleyville (44 ISNB; 1 MNHN; 1 MRAC); Sumbi (1 ISNB); Tali (1 ISNB); Tembo (1 ISNB); Tsele (7 ISNB); Tshuapa Etata (1 MRAC); Tueya (1 MRAC); Ubangui (Oubangui) (Oubangui): Boyanku (1 MRAC); Umagi (1 ISNB); Vaku-Luzi (1 ISNB); Yangambi (1 MRAC); Zongo (1 ISNB); ZIMBABWE: Mt. Selinda, Chirinda forest (21 SANC; 1 TMSA). Mcalalo (1 MNHN). No locality label (3 MNHN).

Geographical distribution (Fig. 14)

Angola, Cameroun, Congo, Ethiopia, Gabon, Ghana, Guinea, Guinea Bissau, Ivory Coast, Kenya, Liberia, Mozambique, Nigeria, Portuguese Guinea, Senegal, Sierra Leone, Spanish Guinea, Uganda, Zaire.

Diagnosis

This is the most variable species of the whole genus, with a wide distribution range, which probably originated in the tropics (Zaire). The only distinguishing character is the form of the aedeagus.

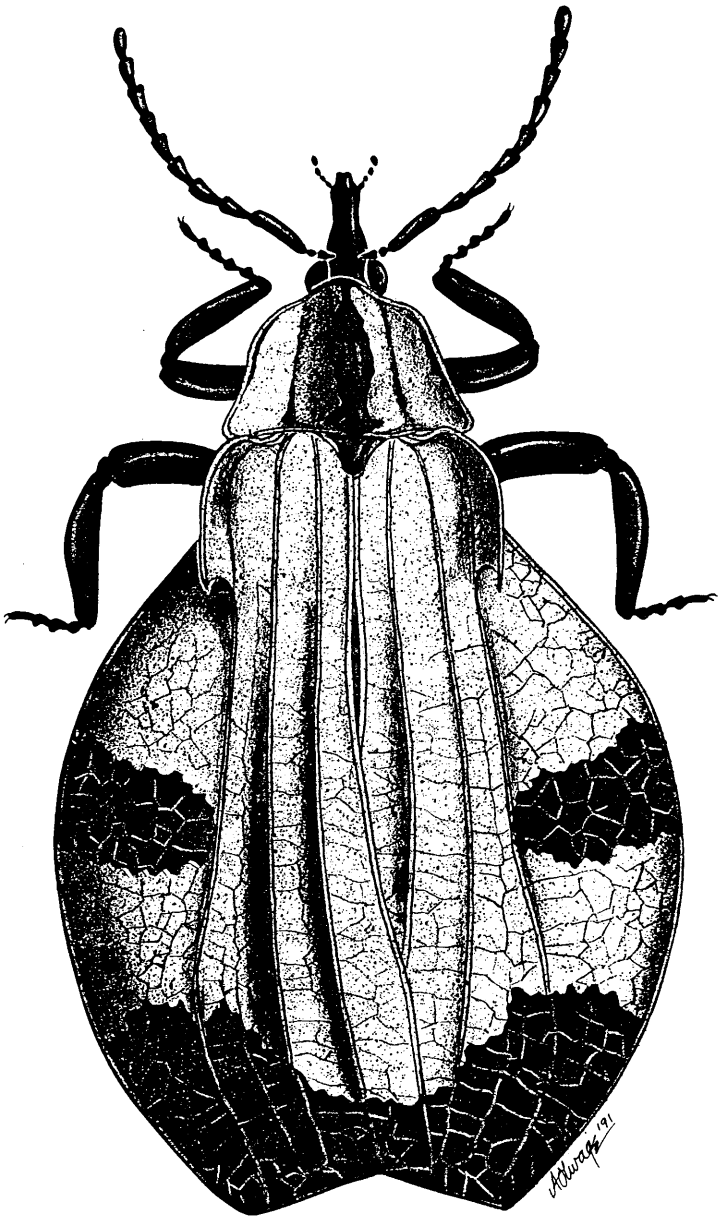


Figure 15: *Lycus (Acantholycus) latissimus* L.

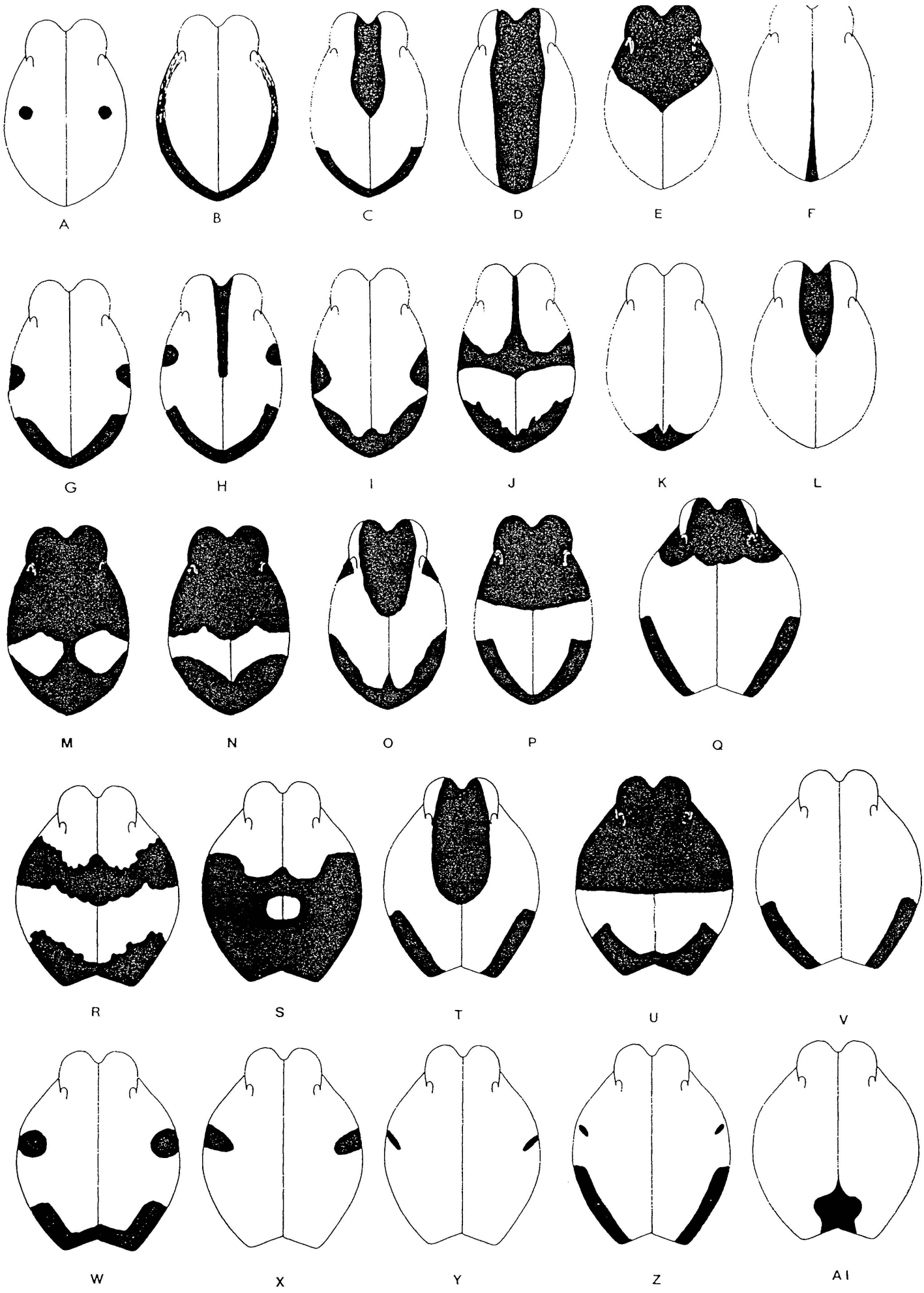


Figure 16A - A_1: Elytral colour and form variations in *Lycus latissimus*. - **E** v. *basalaris*. - **F** v. *suturalis*. - **G** v. *subdenticulatus*. - **K** *modestus*. - **M** v. *fenestratus*. - **P** v. *leveillei* & v. *mocquerysi*. - **R** *harpargo*. - **V** *elegans*. - **W** *praemorsus*. - **Z** v. *ornatus*.

Lycus (Acantholycus) melanurus Dalman

(Figs 17, 18 & 21C)

Lycus melanurus Dalman, 1817: 28♀; Waterhouse, 1879: 19; Kleine 1933: 10.

cuspidatus Klug, 1855: 648.

aeolus Murray, 1868: 331.

constrictus Fåhraeus, 1851: 434♀; Gerstaecker 1873: 154; Bourgeois 1880b: 1; 1900: 139; 1901: 35; 1902: 737 (v. *conjunctus*); 1908a: 270 (v. *nyanzae*); 1908c: 106; Pic 1926: 124; Kleine 1935a: 102; 1937: 65; Pic 1955: 175 (v. *nyanzae*); Gomes-Alves 1956: 213; 1959: 19; 1962: 40; 1967: 46; Marie 1968: 343; Gomes-Alves 1978: 12. **syn. nov.**

TYPES: *L. melanurus*. HT (female): Sierra Leone, Afzelius; 166/89; (NHRS).

L. aeolus. HT (male): syntype; Old Calabar 78.19; (BMNH).

Redescription

MALE

Size: length 10,5-21,0 mm; hum. width 4,0-8,5 mm; width 7,5-17,5 mm.

Head: transversely depressed between eyes, forming two deep pits.

Rostrum: long and slender; 2-2,50X distance between eyes.

Antennae: 4-10 serrate; 3>4+5; 10<11.

Maxillary palpi: relatively slender with last segment broadly elongated.

Colouration: antennae, head, mesal part of pronotum, abdomen (varying), legs and scutellum black; rest of pronotum, abdomen (varying from completely ochraceous except for last two segments) and elytra ochraceous; posterior 1/5, ascending along sides to 1/2 way up, marginal up to roughly 1/4 of elytra black (Fig. 17).

Pronotum: broader than long; 1:1,50-1,70; subrectangular with antero-lateral angles obtusely rounded; anterior protruding with anterior angle obtuse and ridged; posterior angles acutely reflexed; sides slightly reflexed upwards.

Elytra: texture matt; laterally dilated, and inflated forming so-called "cheeks", spiniform at truncate extremities (extremities varying to slightly more straight); humeral crests extended, curved, terminating in spines; sutural margin slightly convexly extending (overlapping) from approximately 1/3 downwards; costae 1 and 2 prominent, 3 indistinct, 4 visible; reticulate cells indistinct, with more or less two rows between sutural margin and costae 1, 2, and 1 row between 2, 3 and 4 (Fig. 17).

Abdomen: penultimate segment with lateral protruding extensions posteriorly; last segment triangular.

Legs: simple.

Male genitalia: parameres closely fused to median lobe, distinct; median lobe roundly furcate (hooked) apically, with posterior lobe pointed, ventral lobe broader (Fig. 21C).

FEMALE

Size: length 11,0-19,0 mm; width 6,0-12,0 mm.

The elytra and body similar in colouration to male, but differs in form, being less dilated with humeral crests not spiniform, and smaller. The sutural margin is straight with ovally-rounded extremities.

Discussion

Dalman (1817) described the species *L. melanurus* from Sierra Leone based on a female specimen. Waterhouse (1879) synonymized the species *L. aeolus* Murray with *L. melanurus*. The species *aeolus* was also synonymized under *constrictus* Fåhraeus. As *melanurus* Dalman is the oldest described species it retains the name and *constrictus* is synonymized.

According to Kleine (1937), the variation in colour is minimal, but there are big differences in size. In the small males the elytra are less dilated, but the humeral spines are hardly subject to reduction. This species is very stable in elytra colouration and form.

Gomes-Alves (1956; 1967) noted that *L. melanurus* (*constrictus*) and *L. latissimus* (L.) were the most common species collected in Angola. Host plant species on which *L. melanurus* was collected were *Citrus* spp: *C. aurantium*, *C. nobilis*; and *Helianthus annus*; *Pyrus malus*; *Sacharum officinarum* (Gomes-Alves (1978).

This species is very similar to *latissimus* (L.), but differs by the form of the elytra, colouration and aedeagus being very constant. The form of the spiniform humeral crests also differ, being more similar in shape to *L. corniger* Dalman.

Material examined

636 specimens examined.

AFRICA: "Afrique" (1 ISNB). ANGOLA: (3 BMNH); Dondo (Cambambe) (2 TMSA); Jamba la Mina (1 SMWH); Luceque (2 SMWH); Salazar (1 BMNH). BOTSWANA: Maun 20 Km SW (1 UPSA); Shakawe Waste Ground (1 TMSA). ETHIOPIA: "Abyssinie" (1 MNHN). KENYA: Kisoumou (Victoria Nyanza) (6 MNHN). MALAWI: Chiromo (1 BMNH); Fort Liste Mt. Mlanje 1100m (2 UPSA); Lauderdale Estate Mt. Mlanje 900m (17 BMNH; 2 UPSA); Mwaers (1 UPSA). MOZAMBIQUE: (1 MNHN). Delagoa Bay (1 MNHN); Env. de Beira Manga (11 MNHN); Inhaca Isl (1 TMSA); "L.M." Maputo (26 TMSA); Zambeze, Caia (1 BMNH); Zambeze, Chemba (1 MNHN); Zambeze, Tambara (1

MNHN); Xinavane (1 MNHN). NAMIBIA: Andara (1 SMWH); Batelwa, Kwando R E Caprivi (2 SANC); Katima Mulilo (1 TMSA); Windhoek (1 SMWH). NIGERIA: Olokmegi, Ibadan (1 SANC). SOMALIA: (3 MNHN; 1 SANC). SOUTH AFRICA: CP. (4 ISNB); Maidstone (9 SANC); Vryburg (1 SANC); NAT. (5 MNHN; 2 SAMC; 3 TMSA); Amatikulu (1 UPSA); Conjeni (1 UPSA); Durban "Port Natal" (1 TMSA); Dukuduku For. Res. (10 SANC; 5 TMSA); Durban (2 BMNH; 11 SAMC; 2 SANC); Empangeni (5 SANC; 6 TMSA; 8 UPSA); Empangeni, Nyala PK (2 TMSA); Ginindhlovu (1 TMSA); Greytown (1 SANC); Hibberdene (1 UPSA); Howick (1 BMNH); Impingo (Isipingo) (1 SAMC); Kosi Bay (3 UPSA); Loteni Res. (1 TMSA); Mfongosi (1 SANC); Magudu (2 TMSA); Malvern (1 BMNH; 4 SAMC; 1 SANC; 4 TMSA); Margate (2 SANC); Mtunzini (5 SANC); Ndumu (2 TMSA); Pietermaritsburg (2 SAMC); Pongola (3 SANC; 1 TMSA; 1 UPSA); Port Shepstone (1 UPSA); Sodwana Bay Nat. Park (1 SAMC; 2 UPSA); Tongaat (6 TMSA); Umfolozi (1 TMSA); Umkomaas (6 SANC); Umvoli (2 SAMC); University Zululand (3 UPSA); TVL. (2 ISNB; 1 BMNH); Agatha (1 UPSA); Barberton (1 SAMC; 2 SANC; 7 TMSA); Bashewa (1 UPSA); Ben Alberts Nat. Res., Thabazimbi (1 SANC); Blouberg (Liepsig Mission Station) (1 TMSA); Blyde Rivier (2 TMSA); Boksburg (1 TMSA); Chuniespoort 20 km SE Pietersburg (1 SANC); De Kuilen, Lydenburg (1 SANC); Doorndraai Dam Nat. Res. (1 SANC); Ermelo (1 UPSA); Fount Grove (11 TMSA); Graskop (1 TMSA); Grasmere (1 UPSA); Groblersdal (1 UPSA); Groenfontein 35 Km E Thabazimbi (1 SANC); Hartebeespoort (1 BMNH); Hazyview (1 UPSA); Hekpoort,nr Magaliesberg (1 SANC); Hoedspruit (2 SANC); Irene (1 UPSA); Johannesburg (1 TMSA); Kralingen, 35 Km NW Warmbad (1 SANC); Krugersdorp (1 BMNH; 2 TMSA); Letaba (1 SAMC); Lichtenburg (1 TMSA); Louis Trichardt (1 BMNH); Lydenburg (5 TMSA); Machadodorp (3 TMSA); Magalieskruin (3 UPSA); Maloth Park (1 UPSA); Marico (1 UPSA); Marikana (1 UPSA); Meyerton (1 UPSA); Middelburg (2 UPSA); Mogoto Nat. Res. (11 SANC); Mooirivier (1 SANC); Mooikopje 237, 30 Km NNW Middelburg (1 UPSA); Nelspruit (1 UPSA); Newington 7 Km N (1 TMSA); Olcolaco (1 TMSA); Origstad (1 TMSA); Pafuri (1 TMSA); Penge, Lydenburg distr. (5 TMSA); Pienaarsrivier (1 TMSA; 1 UPSA); Pietersburg (2 BMNH; 2 UPSA); Potchefstroom (1 TMSA; 1 UPSA); Pretoria (11 SANC; 21 TMSA; 21 UPSA); Pretoriuskop (2 UPSA); Rhenosterpoort NE Bronkhortspruit (2 TMSA); Roodeplaatdam (1 UPSA); Rust de Winter (1 UPSA); Rustenburg Nat. Res. (1 SANC); Saartjiesnek (15 UPSA); Sabie (1 SANC); Schoemansville (1 UPSA); Shilouvane, pres. Leydsdorp (7 MNHN; 1 TMSA); Squamans, 32 Km S Komatipoort (1 SANC); Sterkfontein (5 BMNH); Swartkop, Limpopo (5 TMSA); Thabazimbi (2 UPSA); Three Sisters (4 TMSA); Verwoerdburg (2 UPSA); Wakkerstroom (2 UPSA); Waterberg distr. (1 TMSA); Waterval Onder (1 TMSA); Wonderboom (1 TMSA); Zoutpan 25 Km N Pta. (1 TMSA). TANZANIA: (1 ISNB); Bagamoyo (2 ISNB); Ngorongoro (2 TMSA); Nguelo Usambara (16 ISNB). ZAIRE: (4 ISNB; 1 MNHN); Albertville (9 ISNB); Boma (3 ISNB;1 TMSA); Boma-Banana (13 ISNB); Boma Sundi (6 ISNB); Chiloango (1 ISNB); Haute Maringa (2 ISNB); Ibenibo (1 ISNB); Inongo (2 ISNB); Kandoa (1 MNHN); Kassongo a Stanleyville (25 ISNB); Kinshasa (4 ISNB); Leopoldville (1 ISNB); Luluabourg (1

ISNB); Luluabourg Kasai (1 ISNB); Lukungu (14 ISNB); Matadi (2 ISNB); Moliro (3 ISNB); Rutshuru (1 ISNB); Stanleyville (14 ISNB); Zambi (3 ISNB). ZAMBIA: (1 BMNH); Kashitu N of Broken Hill (2 BMNH); Lake Bangweulu, N'Salushi Island (2 BMNH). ZANZIBAR: (1 ISNB; 6 MNHN; 1 TMSA); Joyami Forest (1 BMNH). ZIMBABWE: Hillside (1 TMSA); Chirinda (1 BMNH); Sebakwe (13 SAMC); Umtali (1 SAMC); "Salisbury" Harare (2 BMNH;2 TMSA).
Unreadable (11 SAMC;2 SANC;2 TMSA); No Label (2 MNHN; 2 SANC; 1 UPSA).

Geographical distribution (Fig. 18A & B)

Angola, Botswana, Cameroun, Ethiopia, Malawi, Mozambique, Namibia, Nigeria, Sierra Leone, Somalia, South Africa (Tvl, Natal, NE Cape, NW OFS), Tanzania, Uganda, Zaire, Zanzibar, Zimbabwe.

Diagnosis

This species is easily distinguished by the colouration of the elytra being very uniform, and the so called "cheeks" or lateral elytral dilations. The aedeagus is very specific in form, as well as the matt elytral texture and prominent costae.

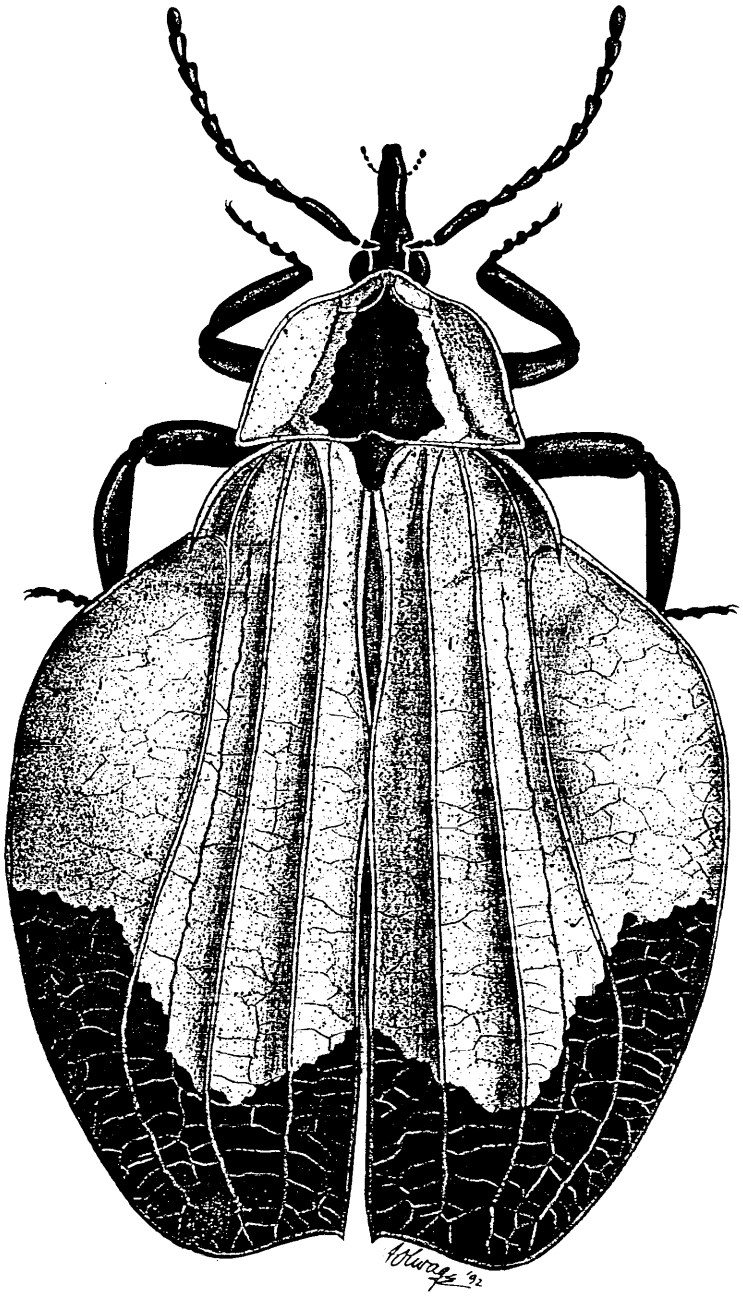
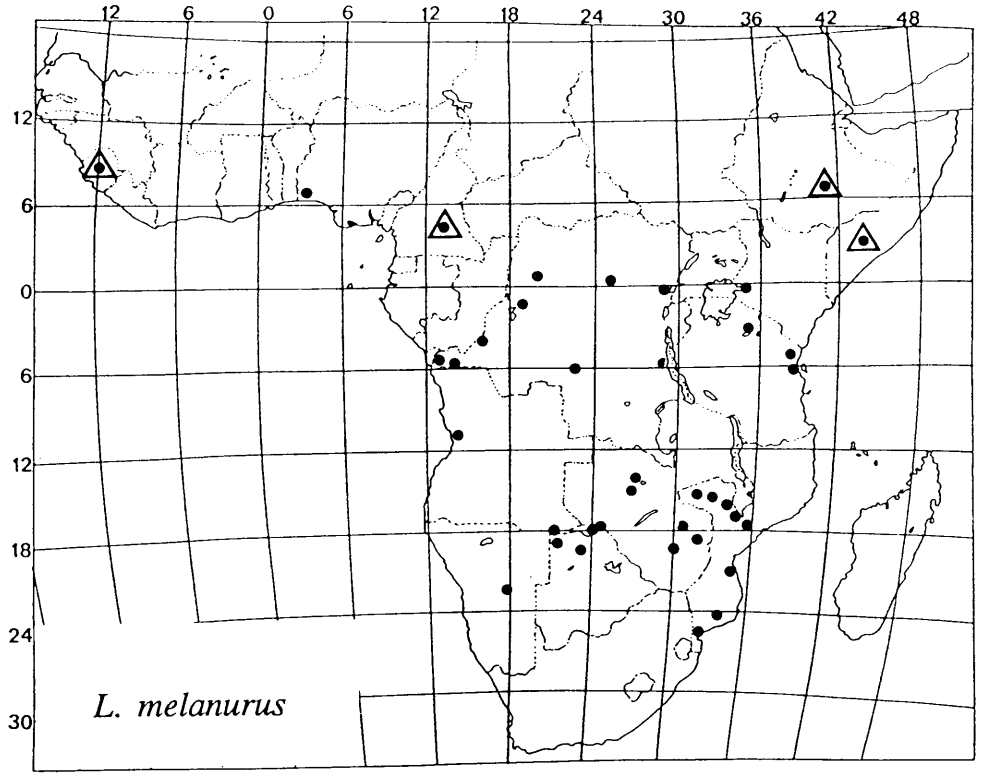


Figure 17: *Lycus (Acantholycus) melanurus* Dalman



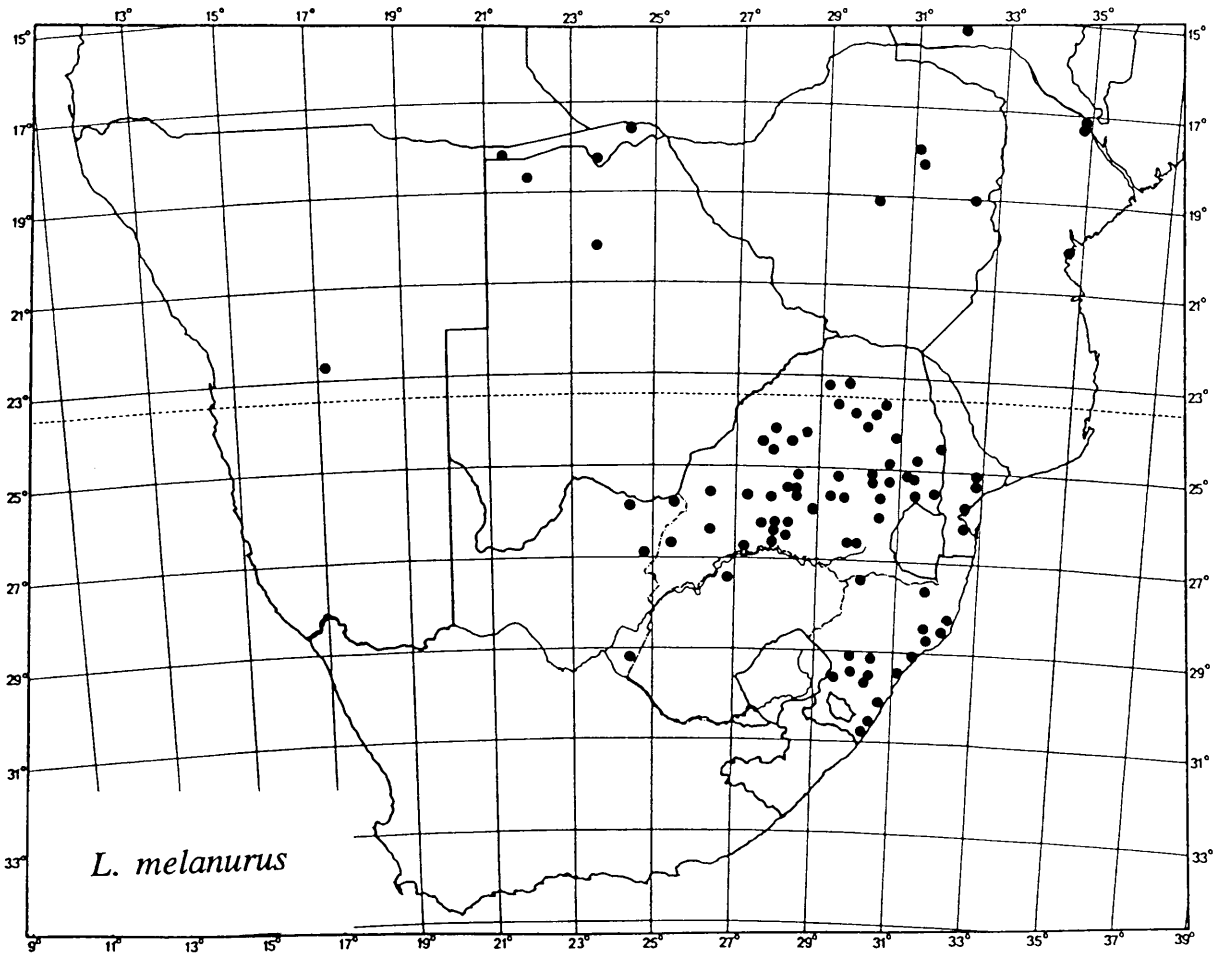


Figure 18A & B: Distribution of *Lycus melanurus*.

5.5.2 Species of the subgenus *Hololycus*

Lycus (Hololycus) intermedius Bourgeois

(Figs 19, 20 & 21F)

Lycus intermedius Bourgeois, 1884: 64; 1900: 142; Kleine 1933: 8; 1937: 73.

TYPE: No type specimen traced (According to Bourgeois (1884) in the coll. Fairmaire).

Redescription

MALE

Size: length 9,5-17,0 mm; hum. width 3,5-7,0 mm; width 8,0-14,0 mm.

Head: transversely depressed between eyes.

Rostrum: long and slender; 2,05-2,35X distance between eyes.

Antennae: 4-10 serrate; 3>4+5; 10<11.

Maxillary palpi: relatively long and slender, last segment elongated and slightly depressed apically.

Colouration: head, antennae, mesal part of pronotum, scutellar area, posterior 1/3 of elytra (black marks concavely decreasing towards the sutural margin ("finger print" colouration), legs, mesal part of abdomen (varying from black to ochraceous) and last segment black; rest of elytra, pronotum and mesal part of abdomen ochraceous (Fig. 19).

Pronotum: broader than long, 1:1,35-1,52; roughly semicircular in shape; anterior angles obtuse, with anterior ridged, slightly protruding; posterior angles acute and reflexed.

Elytra: sides dilated and inflated (similar to "cheeks" of *melanurus* Dalman), extremities rounded; humeral crests bluntly spiniform; 4 distinct costae, with 1 row of irregular reticulate cells between costae and sutural margin; sutural margin straight (Fig. 19).

Abdomen: penultimate segment arched posteriorly, sides protruding posteriorly; last segment triangular.

Legs: simple.

Male genitalia: relatively short and stout; parameres clearly visible, but closely associated with median lobe; anteriorly median lobe pointed and thickened ventrally at apex (Fig. 21F).

FEMALE

Size: length 10,5-18,0 mm; width 6,5-8,0 mm.

Colouration similar to male; form being very much more slender and elongated.

Discussion

According to Bourgeois (1884) the form and colouration similar to *L. melanurus* Dalman, but distinguished by the existence of a black scutellar mark and also the form of the apical black marks on the elytra and four distinct costae. (In *melanurus* the 3rd costa is obsolete).

Material examined

17 specimens examined.

LESOTHO: Basutoland (det. Bourgeois 1900) (2 ISNB). SOUTH AFRICA: CP. Darling (2 SAMC); Humansdorp (1 SAMC); NAT. Mkuzi Game Park (1 SANC; 1 TMSA); Ndumu (6 TMSA; 1 UPSA); TVL. Irene (1 UPSA); Kruger Nat. Park (1 MRAC); Squamans, 32 km S Komatipoort (1 SANC).

Geographical distribution (Fig. 20)

Lesotho, South Africa (Cape, Natal and Tvl) and Zaire.

Diagnosis

Easily distinguished by the dilated elytral form and colouration and the "blunt" humeral spines , as well as four distinct costae. The form of the aedeagus is also very specific.

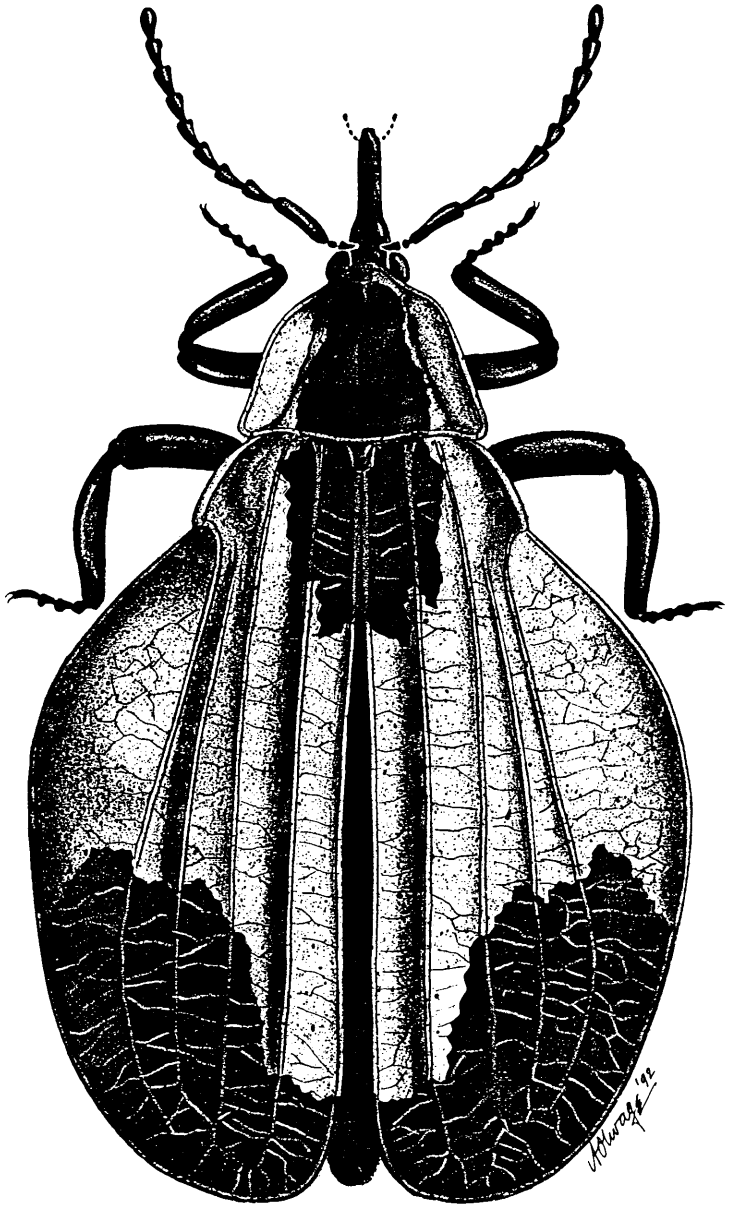


Figure 19: *Lycus (Hololycus) intermedius* Bourgeois

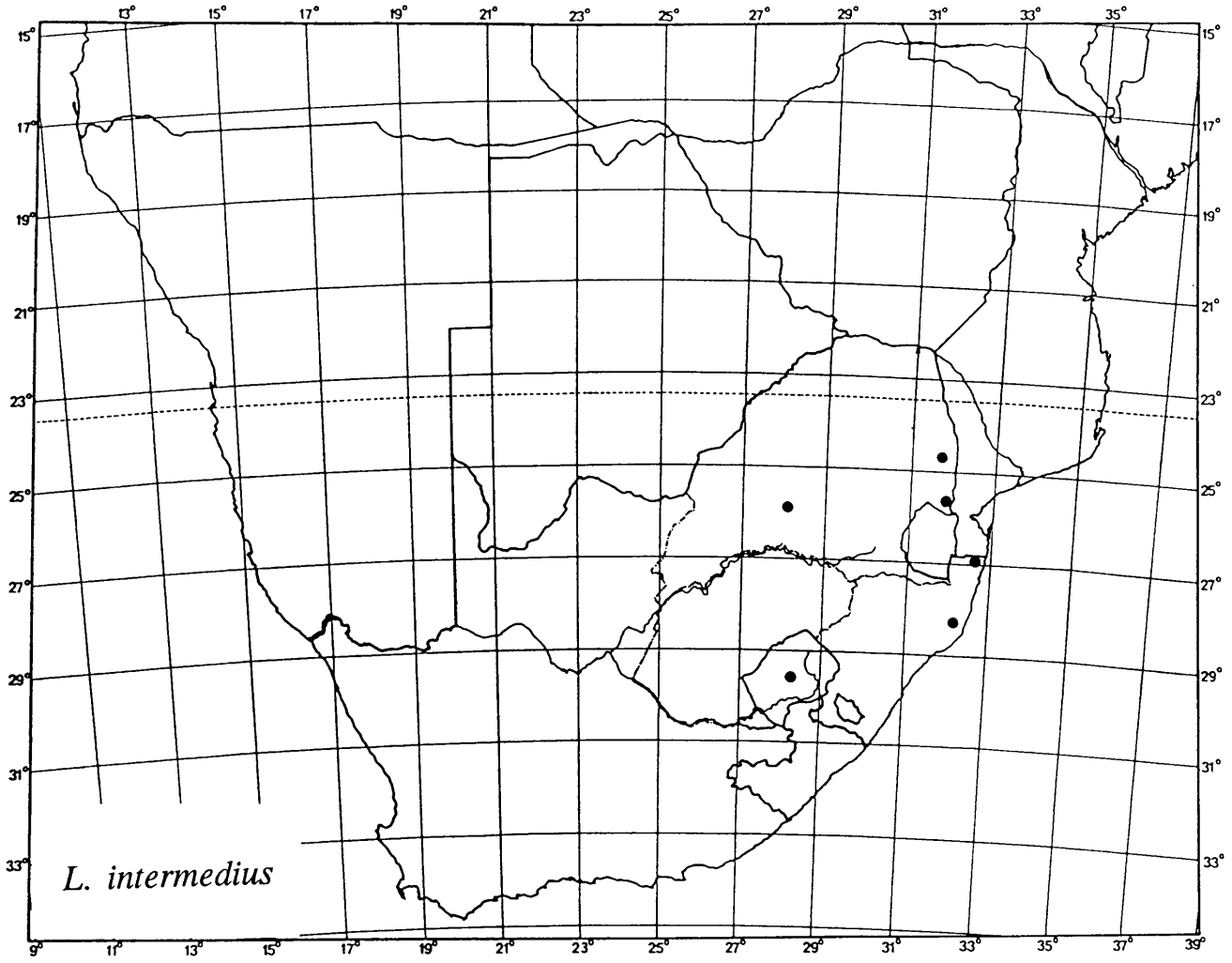


Figure 20: Distribution of *L. intermedius*.

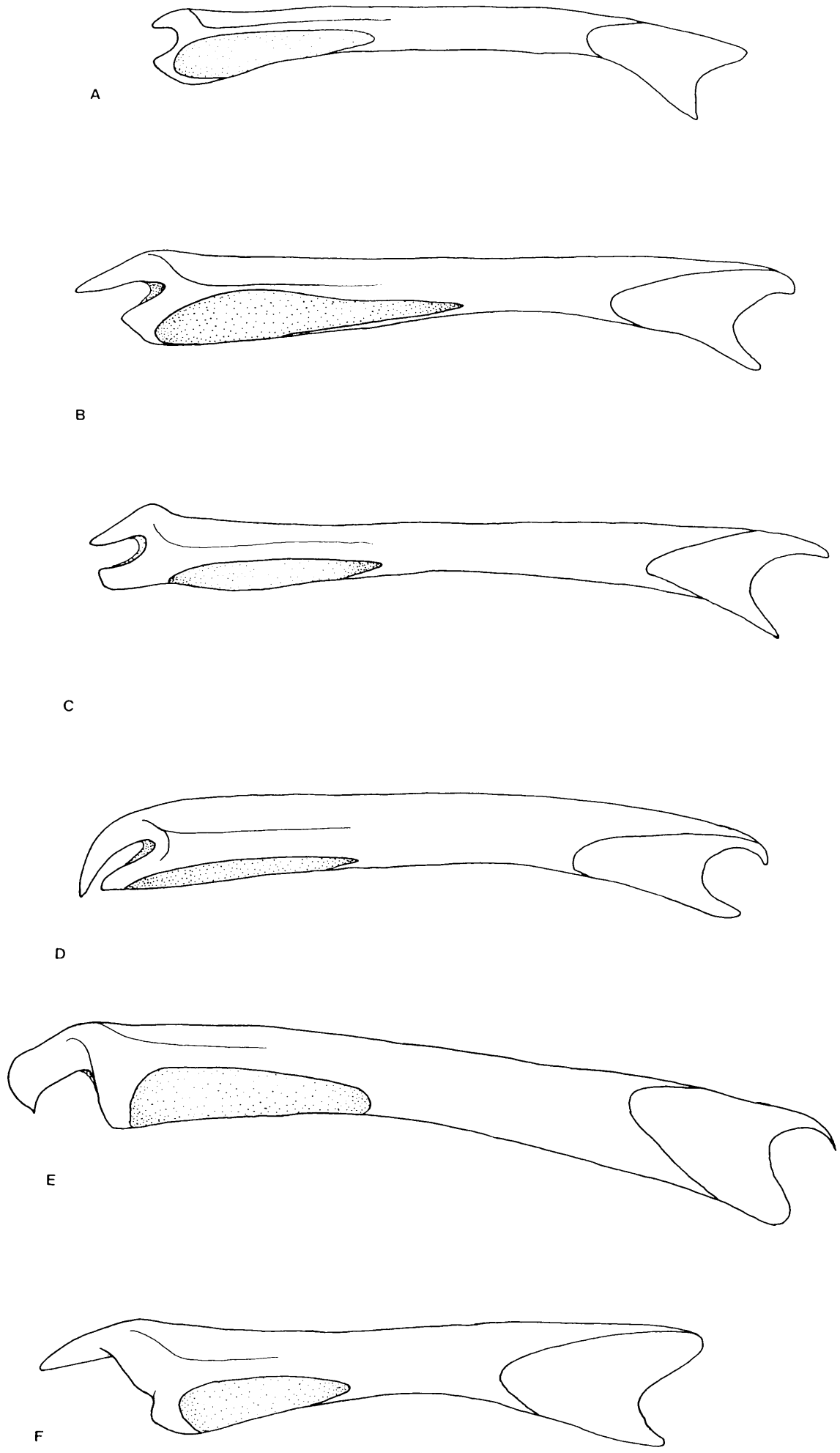


Figure 21A - F: The external male genitalia of: - **A** *L. apicalis*. - **B** *L. corniger*. - **C** *L. melanurus*. - **D** *L. latissimus*. - **E** *L. integer*. - **F** *L. intermedius*.

5.5.3 Species of the subgenus *Lopholycus*

Lycus (Lopholycus) haagi Bourgeois

(Figs 22, 23 & 32A)

Lycus haagi Bourgeois, 1878: 166; 1889a: 225o; Pic 1930: 87 (v. *innotaticollis*); 1933a: 169 (v. *innotatithorax*); Kleine 1933: 8; 1937: 74.

TYPE: LT (male) (new designation): South Africa, Cap de Bonne-Espérance, Kraatz; type; 65516; (ZMHB).

Redescription

MALE.

Size: length 10,0-16,5 mm; hum. width 5,0-9,0 mm; width 5,0-9,0 mm.

Head: deeply depressed between eyes above antennal insertions, forming two pits.

Rostrum: long and slender, 2,20-2,40X distance between eyes.

Antennae: densely setose; 5-10 serrate, compressed; $3>4+5$; $10<11$.

Maxillary palpi: long and slender, last segment slightly broad and depressed apically.

Colouration: head, antennae, mesal part of pronotum (varying), scutellar area, posterior 1/3 of elytra and legs black; sides of pronotum and rest of elytra ochraceous; abdomen varying (from completely ochraceous to mesal part black and sides ochraceous).

Pronotum: broader than long, 1:1,50-1,56; antero-lateral angles greatly obtuse; anterior ridged, slightly ridged protruding; sides reflexed; posterior angles acute.

Elytra: suboval (long and slender) with marked, "winged" humeral crests; elytra sides slightly dilated, broadest at beginning of apical black markings; extremities ovally-rounded; elytral edge with conspicuous long, dense array of setae; sutural margin straight, convexly extending posterior from centre (overlapping); costae 1 and 2 distinct, 3rd indistinct, discontinued at anterior humeral crest; 4th distinct and continuous with lateral margin of humeral crest; irregular rows of fine reticulate cells between costae Fig. 22).

Abdomen: penultimate segment transverse, posteriorly arched; last segment subtriangularly elongated.

Legs: simple.

Male genitalia: long and slender, with median lobe furcate at apex, dorsal lobe curved, forming a hook, ventral lobe straight; parameres small, distinct, closely associated with median lobe (Fig. 32A).

FEMALE

Size: length 12,0 mm; hum.width 3,0 mm; width 5,5 mm (Bourgeois 1889).

No specimens examined.

Discussion

In the original description only male specimens were examined, with the length varying form 11-14 mm and the width from 5,0-7,0 mm. The specimens were all from the South Africa (Cape). One specimen from ZMHB with a "type" label attached, was designated a lectotype as it fits the original description and type locality (Bourgeois 1878). No other "types" could be traced.

According to Bourgeois (1878), this species is very similar to *zonatus* Fåhraeus and *raffrayi* Bourgeois, but can be recognized by the suboval form and the extraordinary development of a "winged" humeral crest in the male. The form of the aedeagus also differs remarkably.

This species is very similar to *L. pusillus* (discussed later).

Material examined

34 specimens were examined.

MOZAMBIQUE: Delagoa (1 MNHN). SOUTH AFRICA: CP. "C. B. Sp." (1 MNHN); NAT. "Natal" (2 TMSA, 1 MNHN); Durban (1 SANC); TVL. (3 ZMHB, 2 MNHN); Barberton (1 SANC); Botschabelo (3 ZMHB); Lydenburg, Rustplaats (1 TMSA); Mogol Nat. Res., Ellisras District (9 SANC); Mogoto Nat. Res., Zebediela (1 SANC); Nylstroom (3 TMSA); Iron Crown Wolkberg, nr. Haenertsburg (1 TMSA). ZIMBABWE: Hillside (3 TMSA).

Geographical distribution (Fig. 23A & B)

Kenya, Mozambique, South Africa (Cape, Natal and Tvl), Tanzania, Zaire and Zimbabwe.

Diagnosis

This species is easily diagnosed by the "winged" humeral crests, and the dense array of long setae on the elytral edge.

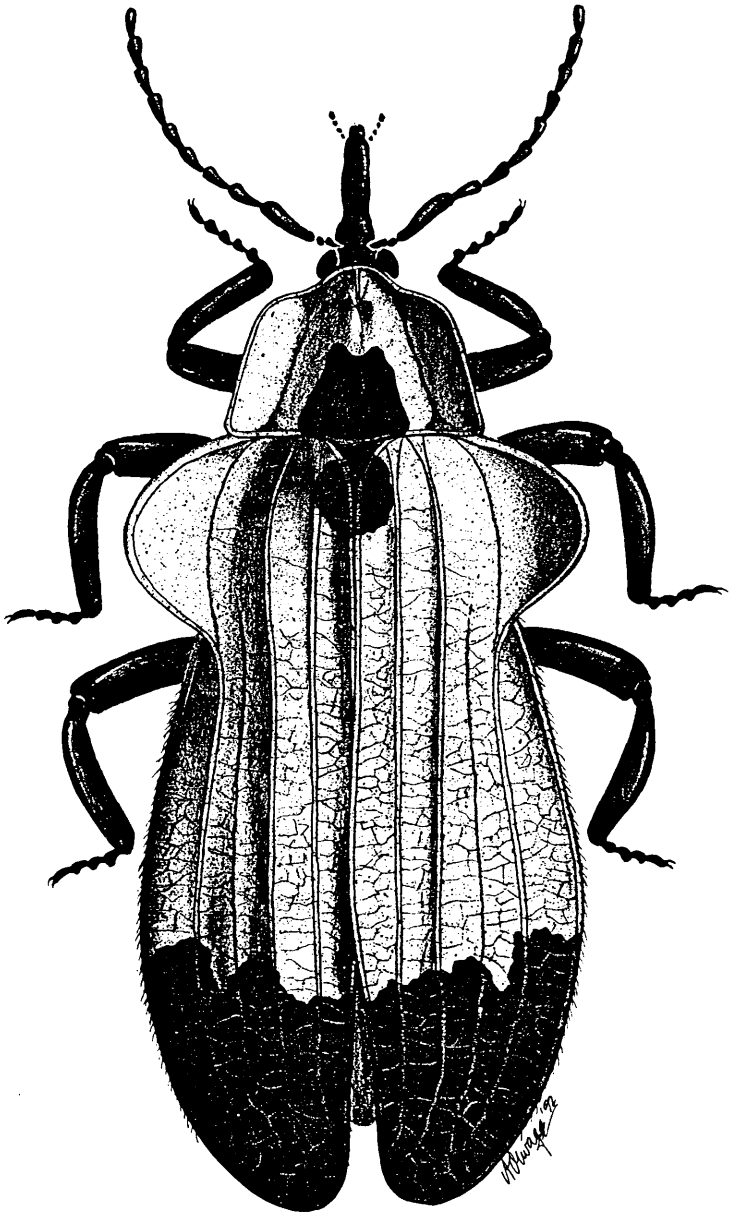
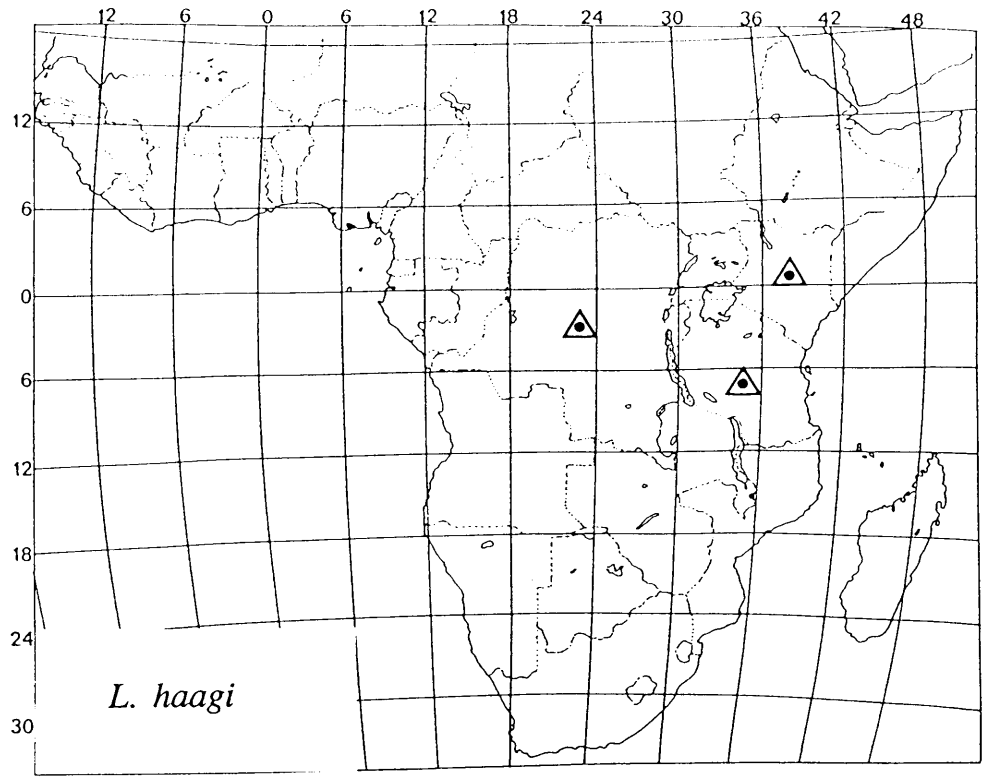


Figure 22: *Lycus (Lopholycus) haagi* Bourgeois



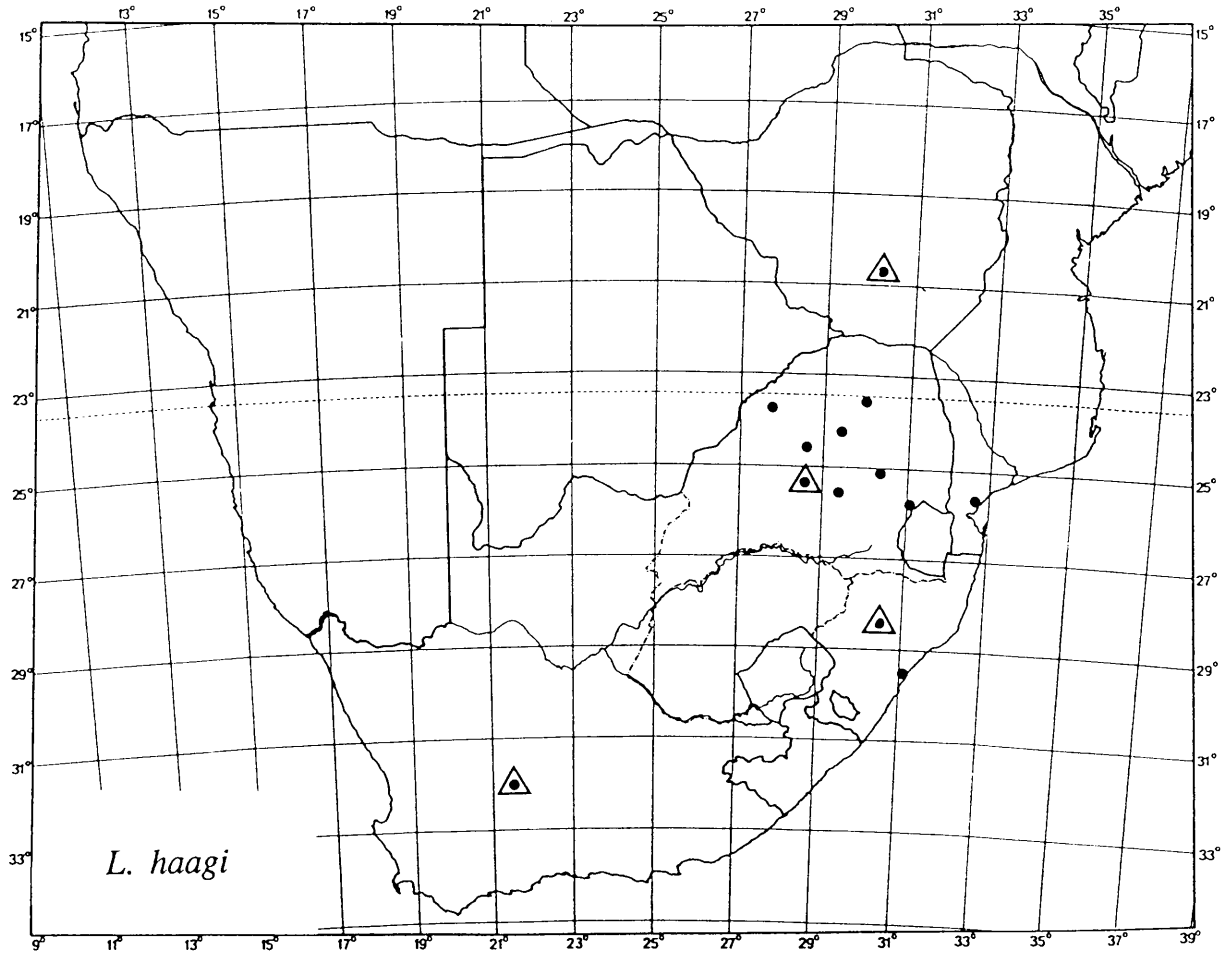


Figure 23A & B: Distribution of *L. haagi*.

Lycus (Lopholycus) integripennis Bourgeois

(Figs 24, 25 & 32B)

Lycus integripennis Bourgeois, 1889a: 226; Kleine 1933: 8.

TYPES: LT and PLT (male) new designation: Type; South Africa, Botschabelo (Tvl.), Niemeyer, Coll. Thieme; 65515 (ZMHB).

Redescription

MALE.

Size: length 9,0-15,0 mm; hum. width 3,0-5,5 mm; lat.max. 5,5-11,0 mm

Head: transversely depressed behind antennae insertions, forming two deep pits.

Rostrum: length 1,82 - 1,93X distance between eyes.

Antennae: 5-10 serrate, compressed; 3<4+5; 10<11.

Maxillary palpi: slender with last segment distinctly broader and compressed apically.

Colouration: head, mesal part pronotum, abdomen, legs, scutellar area, posterior 1/3 of elytra (ragged, uneven margin) black; sides of pronotum, rest of elytra, sides of abdomen (varying, black mesally to completely ochraceous), ochraceous.

Pronotum: broader than long, 1:1,51-1,56; transversally semi-circular; anterior angulation obtuse; anterior margin slightly extended, elevated forming a slightly sinuated ridge; posterior angles acute, slightly reflexed upwards; sides reflexed.

Elytra: obcordate; a slight humeral crest; greatly dilated from just below humeral crest posteriorly, forming two nearly complete semi-circles; sutural margin is straight, but may be slightly concave posteriorly; posterior angles perpendicularly rounded, resulting in rounded extremities; costae 1 and 2 prominent, with 3rd indistinct (obsolete in humeral area), 4th visible (extending into humeral margin); 1 row of reticulate cells between sutural margin, costae 1, 2 & 3; 2 rows of cells between 3 & 4 and lateral margin (Fig. 24).

Abdomen: penultimate segment rounded posteriorly (not deeply arched); last segment triangular.

Legs: simple.

Male genitalia: relatively small and simple; parameres closely fused to median lobe, hardly distinct; median lobe is slender, slightly curved and pointed apically (Fig. 32B).

FEMALE

Size: length 8,0-12,5 mm; width 4,0-7,0 mm.

A relatively small species, similar in colour to male, elytra not as dilated, but elongated in form.

Discussion

According to Bourgeois (1889), this species is very similar to *L. raffrayi* Bourgeois and *L. consobrinus* Bourgeois, but differs in the prothorax having the posterior angle less blunt, more pointed and the elytra shorter and more dilated laterally. The form of the abdomen is more rounded, varying in colouration.

The form of the aedeagus very similar to *L. zonatus* Fåhraeus, but differs in the form and colouration of the elytra (being very stable in *L. integripennis* and *zonatus*). The distribution range is also very different.

Material examined

281 specimens examined.

NAMIBIA: Windhoek (1 SANC). SOUTH AFRICA: CP. Kuruman (17 UPSA); OFS. Bothaville (8 TMSA); Kroonstad (1 SANC); TVL. Die Bron, 15km - Groblersdal (1 UPSA); Hennops River, 20 km W of Pretoria (2 SANC); Irene (1 UPSA); Johannesburg (3 males, 3 females SANC, 3 SAMC); Loskopdam Nat. Res. (1 SANC); Lydenburg (1 TMSA); Lyttelton, Pretoria (1 SANC); Olifantsrus, nr. Witbank (1 SANC); Ottoshoop (2 TMSA); Pienaars Riv. Dam, Pretoria Dist. (2 SANC); Potchefstroom (1 TMSA); Potchefstroom, 15 miles SW (3 SANC); Pretoria, 20mls N (5 SANC); Pretoria (9 TMSA, 3 UPSA); Renosterpoort, NE Bronkhorstspruit (2 TMSA); Roodeplaat Dam Nat. Res. (1 SANC); Rustenburg Nat. Res. (5 SANC); Saartjiesnek (89 males, 56 females UPSA); Vaalwater (1 UPSA); Wapadrand (15 males, 16 females UPSA); Wonderboom (1 TMSA); Zoutpan 25 mls N Pretoria (7 TMSA).

Geographical distribution (Fig. 25)

One specimen was collected in Windhoek (Namibia) (not yet verified). South Africa (Cape, O.F.S. N Natal and Tvl).

Diagnosis

Easily recognized by the relatively small size, slight humeral crest, lateral dilation of the elytra (commencing from just below the humeral crests) resulting in the rounded form posteriorly, and the simple form of the aedeagus simple.

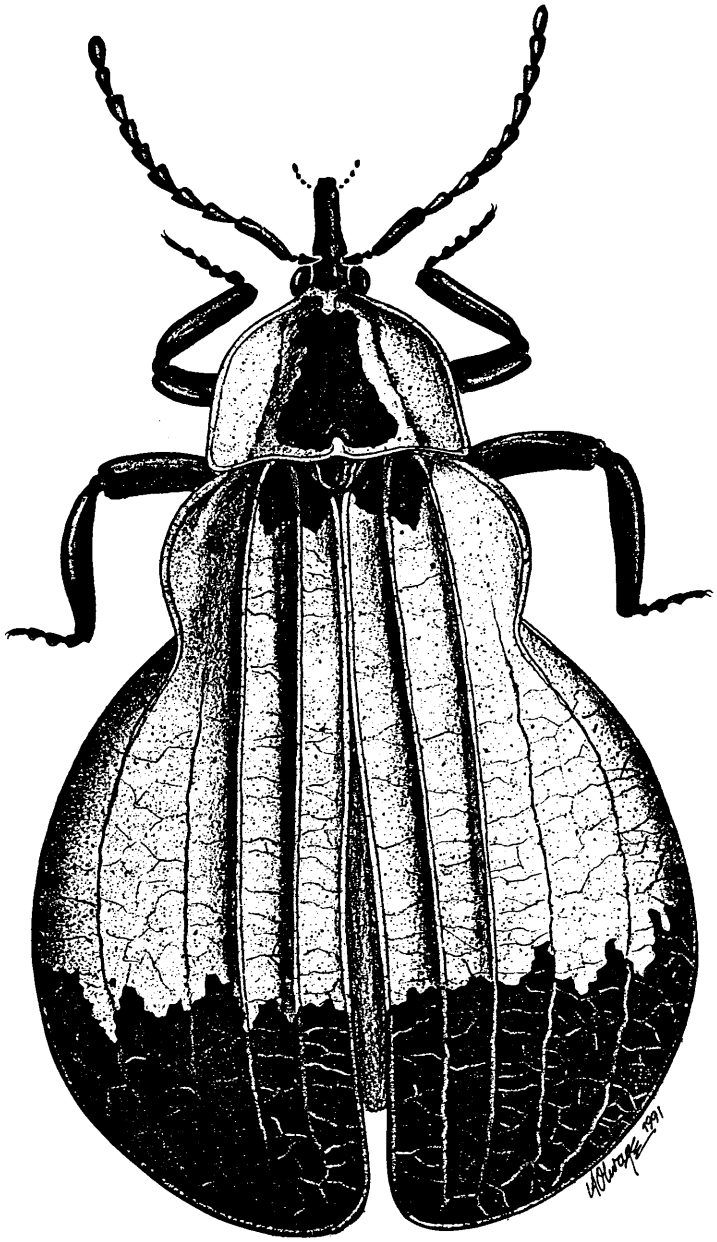


Figure 24: *Lycus (Lopholycus) integripennis* Bourgeois.

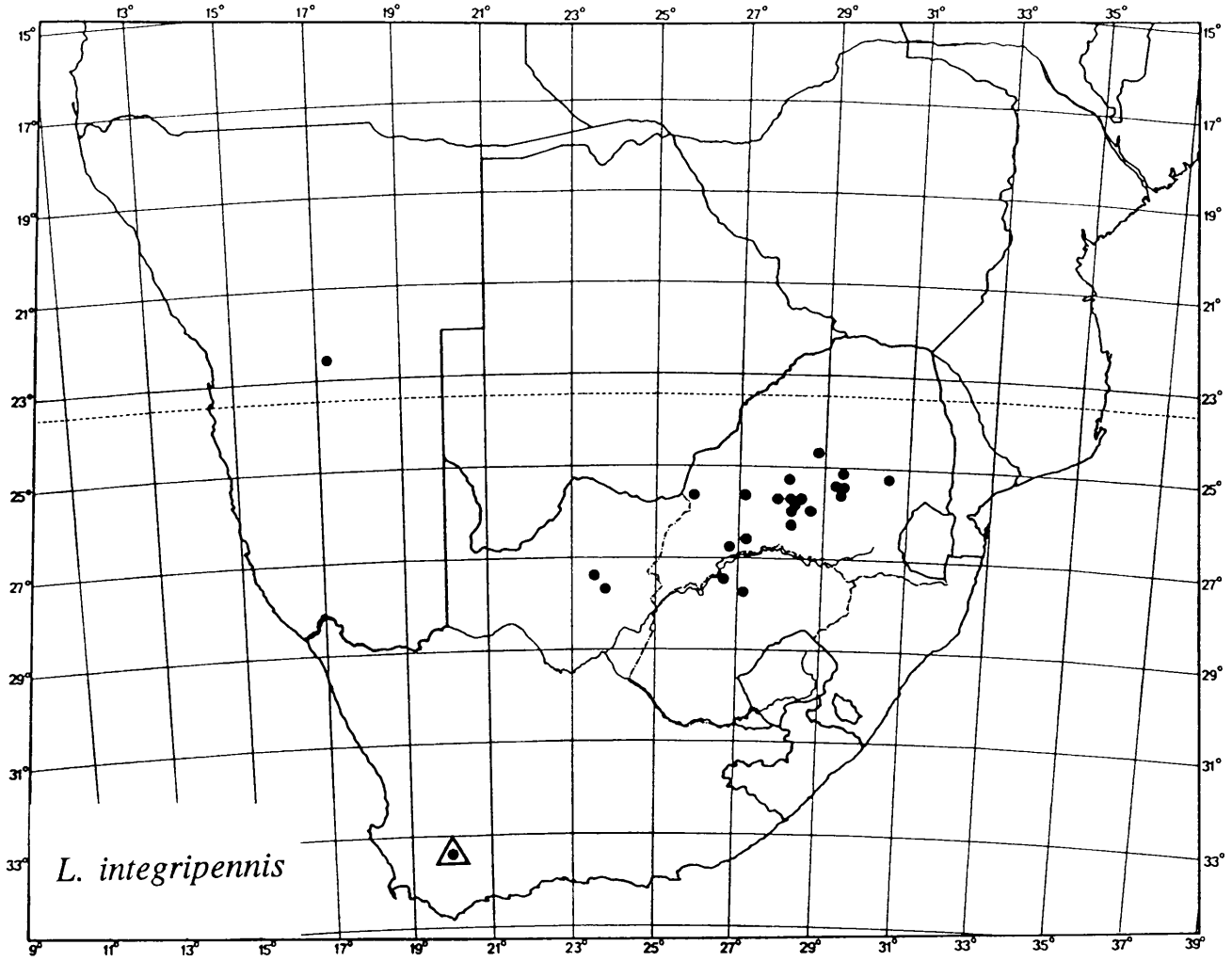


Figure 25: Distribution of *Lycus integripennis*.

Lycus (Lopholycus) pusillus Kleine

(Figs 26, 27 & 32C)

Lycus pusillus Kleine, 1939: 263.

TYPES: 3PTS (1 male; 2 females): cotypus; Paratypus 538; ex coll. R Kleine, 12/45; Chirinda forest, Mashonal'd, Oct 05; G.A.K. Marshall, 1908-212; (ZMPA).

Redescription

MALE

Size: length 9,0-10,0 mm; hum. width 4,0 mm; width 4,0-4,5 mm.

Head: transversely depressed between eyes, forming two deep pits.

Rostrum: long and slender; 1,95-2,15X distance between eyes.

Maxillary palpi: long and slender, last segment broadly flattened apically.

Colouration: head, antennae, thorax, abdomen, legs, scutellum, mesal part of pronotum and posterior 1/2 of elytra black (apical black markings ascending mesally to humeral area); rest of pronotum and elytra ochraceous.

Pronotum: broader than long, 1:1,35-1,40; anterior angles obtuse, with anterior slightly protruding; posterior angles acute and reflexed.

Elytra: elongated, sides slightly dilated; prominently rounded humeral crest; side margins with long setae; costae 1, 2 and 4 distinct, 3rd visible but fading in humeral area and posteriorly; fine reticulate network between costae; sutural margin straight; sutural angle acutely elongated, extremities ovally elongated (Fig. 26).

Abdomen: penultimate segment rectangular, with posterior margin deeply arched mesally; last segment triangularly elongated.

Legs: simple.

Male genitalia: long and slender; parameres closely fused but visible; median lobe hooked apically; dorsal lobe broad and rounded, ventral lobe small (Fig. 32C).

FEMALE

Size: length 7,5-8,0 mm; width 4,0 mm.

Elytra elongated, similar in form to male, except no humeral crests; colouration similar to male.

Discussion

Antenna and last segment of the male specimen examined were incomplete. This is a small, elongated and fragile species.

Very similar to *L. haagi* Bourgeois, but smaller in size. Similar in the form of the elytra , but humeral dilations not as large and elongated (more rounded) and the aedeagi also slightly different. There is also a marked difference in the apical black colouration of the elytra. The distribution range also differs. *L. pusillus* and *L. haagi* seem to be closely related species.

Material examined

3 type specimens examined.

Geographical distribution (Fig. 27)

Zimbabwe.

Diagnosis

Easily distinguished by the rounded humeral crests, setose lateral elytral margins and the form of the aedeagus (but may be mistaken for *haagi* Bourgeois - see discussion).

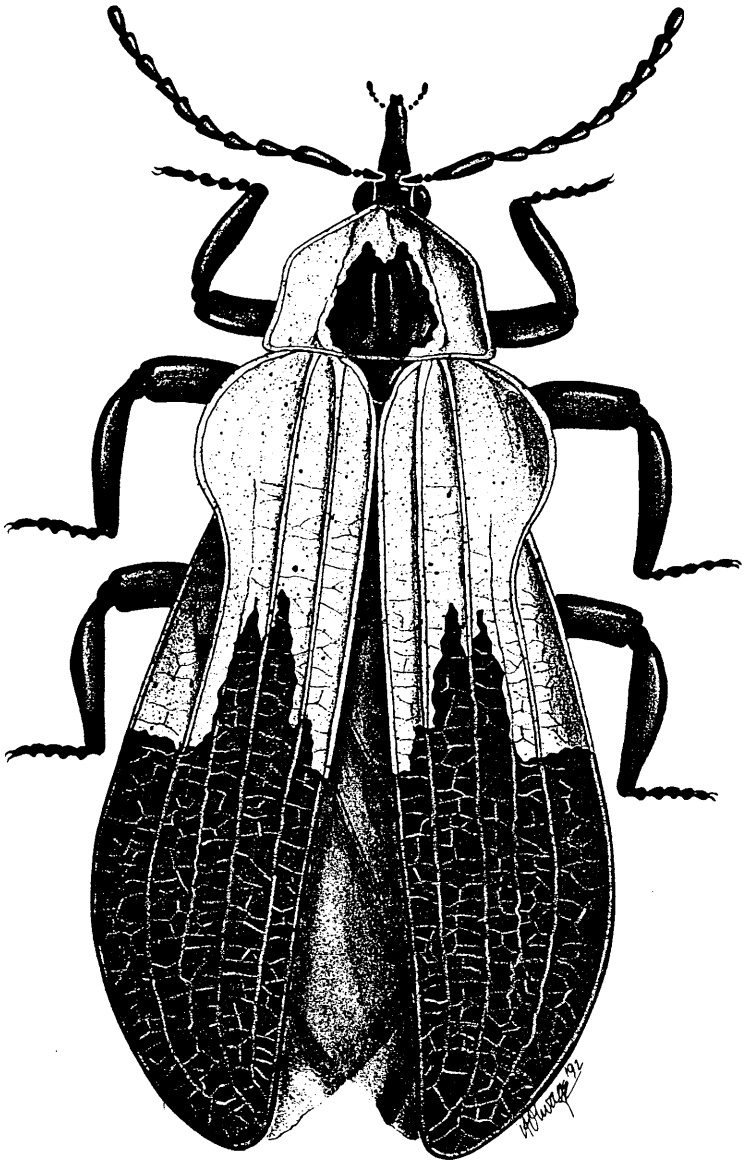
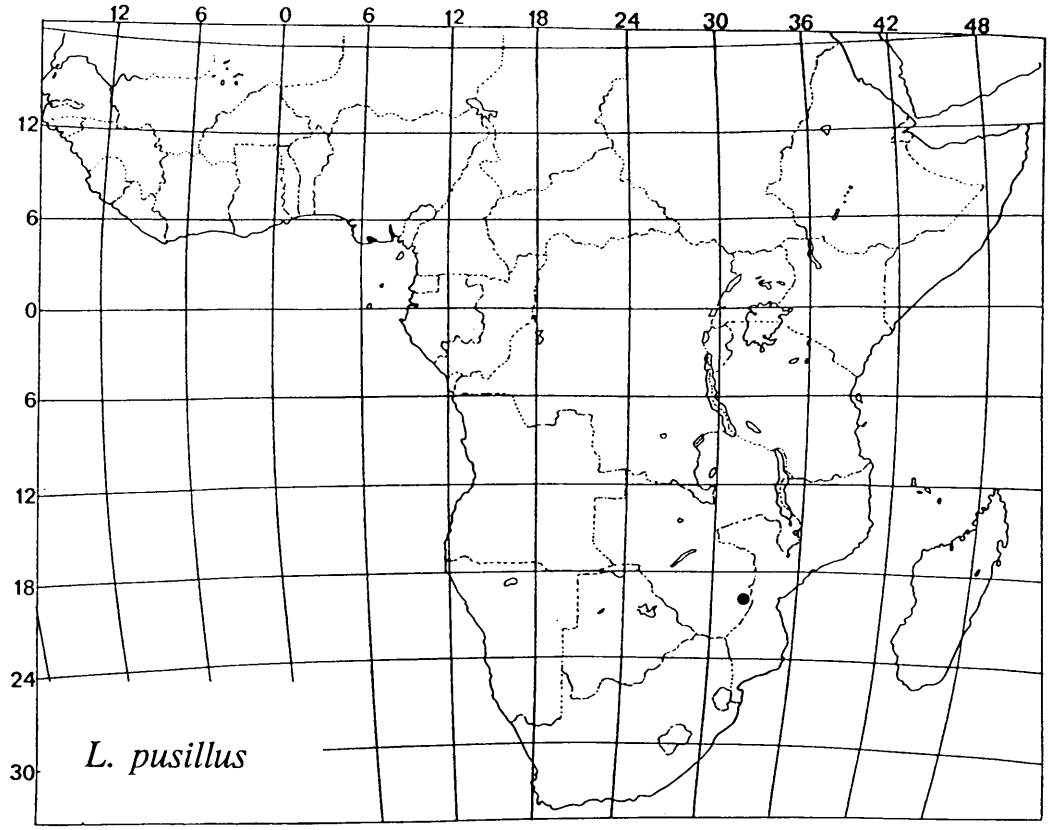
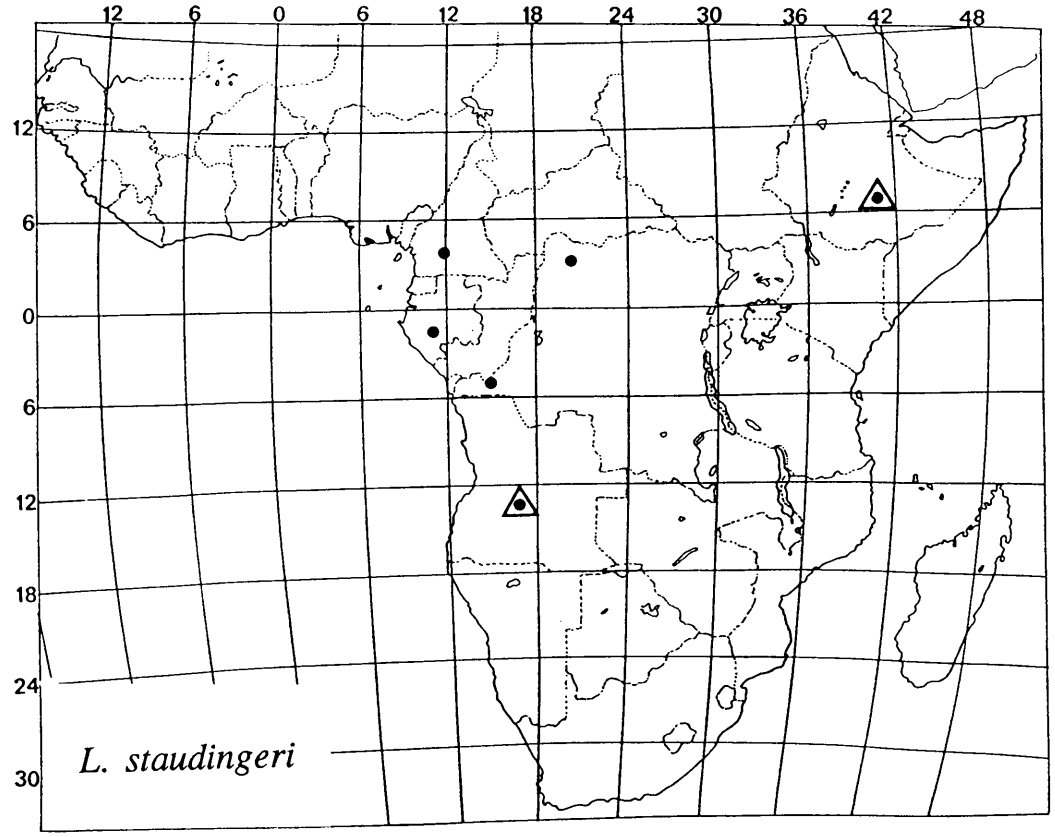


Figure 26: *Lycus (Lopholycus) pusillus* Kleine.



27



28

Figure 27 & 28: -27 Distribution of *L. pusillus*. - **28** Distribution of *L. staudingeri*.

Lycus (Lopholycus) staudingeri Bourgeois

(Figs 28, 29 & 32D)

Lycus staudingeri Bourgeois, 1899: 658; Pic 1926: 126; Kleine 1933: 8; Pic 1933b: 334 (v. *prescutellaris*); Kleine 1937: 78; Gomes-Alves 1967: 48; 1978: 15.

TYPES: LT (male); 2PLT (males) (new designation): Gabon, Riv Ngamie, Chutes de Samlia, 1890 A. Mocqueys (ISNB).

Redescription

MALE

Size: length 9,0-14,0 mm; hum. width 2,5-4,5 mm; width 5,0-8,0 mm.

Head: transversely depressed between eyes, forming two deep pits.

Rostrum: short and stout; 1,09 - 1,34X distance between eyes.

Antennae: 4-10 serrate; 3<4+5; 10<11.

Maxillary palpi: small, slender, last segment relatively broad.

Colouration: head, antennae, abdomen, posterior 1/2 of elytra (varying), scutellar area (black markings), posterior half of elytra centrally), scutellum, mesal part of pronotum (varying), legs black; rest of elytra and pronotum ochraceous.

Pronotum: broader than long; 1:1,45-1,55; anterior angles greatly obtuse; posterior angles acute and reflexed; lateral sides slightly reflexed upwards and outwards.

Elytra: elongated with slight humeral crests; elytra slightly dilated laterally; extremities ovally-rounded; sutural margin more or less straight (slightly apart apically); costae 1, 2 and 4 prominent, 3rd visible but irregular; irregular reticulate network between costae (Fig. 29).

Abdomen: penultimate segment transverse, posterior margin slightly arched mesally; last segment triangular.

Legs: simple.

Male genitalia: parameres closely fused, hardly visible; median lobe long, slender, curved and pointed apically (Fig. 32D).

FEMALE

No specimens seen.

Discussion

Kleine (1937) noted that form of the pronotum, elytral and colouration is very variable. There seems to be much confusion in the determination of this species, as can be seen by the wrongly determined labels (by Marie 1971) of specimens. This species is similar to *L. flammeatus* Bourgeois. Differing by (a) colouration of the elytra (*flammeatus* more black markings), (b) form of the penultimate and last abdominal segments (*flammeatus* has penultimate segment not as transverse, more square, and last segment more elongately triangular) and (c) length of the rostrum (*flammeatus* has a very long and slender rostrum). This species is also very similar to *L. zonatus* Fåhraeus, both in elytral form and aedeagal form. The only difference is in the colouration and form of the elytra (*zonatus* having humeral crests with very dark black markings, the form of the elytra more stout, not as elongated) and the distribution range differs. The description by Gomes-Alves (1967) seems to be of *zonatus*, with distribution in Lesotho.

This species could easily be placed in the subgenus *Hololycus*, with the elongated elytral form which is similar in the male and female.

The host species: *Persea gratissima* (Gomes-Alves 1978).

Material examined

6 specimens examined.

CAMEROUN: Nkolbisson (1 MRAC). ZAIRE: Lemfu (1 MRAC). Likimi. Gwanga (1 ISNB).

Geographical distribution (Fig. 28)

Angola, Cameroun, Ethiopia, Gabon, Lesotho (Gomes-Alves 1967) and Zaire.

Diagnosis

A small species, with a short and stout rostrum and posterior half of elytra black and elongated, aedeagus long, slender and pointed apically.

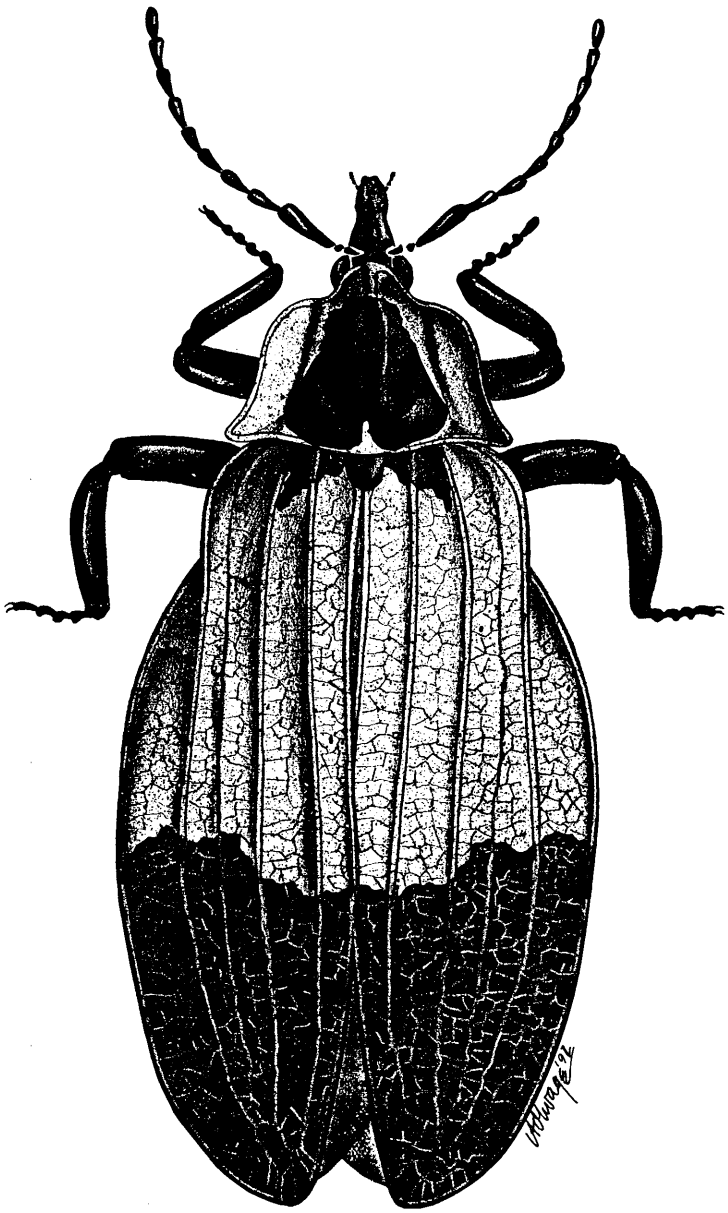


Figure 29: *Lycus (Lopholycus) staudingeri* Bourgeois.

Lycus (Lopholycus) zonatus Fåhraeus

(Figs 30, 31 & 32E)

Lycus zonatus Fåhraeus, 1851: 436; Bourgeois 1900: 142♀; 1901: 38; Kleine 1933: 9.

perpusillus Kleine, 1942: 150. **syn.nov.**

TYPES: No type specimen traced for *L. zonatus*.

L. perpusillus: 3PT (males): Cotypus; paratypus 436; Natal; ex coll. R Kleine (ZMPA).

Redescription

MALE

Size: length 6,5-10,0 mm; hum. width 2,5-4,0 mm; width 3,0-6,0 mm.

Head: transversely depressed between eyes, forming two deep pits.

Rostrum: long and slender; 1,95-2,15X distance between eyes.

Antennae: 4-10 serrate; 3<4+5; 10<11.

Maxillary palpi: small, but long and slender, last segment broadly depressed apically.

Colouration: head, antennae, mesal part of pronotum and abdomen (including last segment), legs, humero-scutellar area black (1/6 of anterior part of elytra), posterior 1/3 of elytra black, rest of elytra, pronotum and abdomen ochraceous.

Pronotum: broader than long, 1:1,56-1,60; anterior angles obtuse with anterior margin ridged and protruding; posterior angles acute, reflexed and slightly pointed.

Elytra: glabrous; slight humeral crests (rectangular in form); sides slightly dilated, elongated; costae 1 and 2 prominent; 3rd indistinct, obsolete in humeral area, 4th visible and extending anteriorly into lateral humeral margin; an indistinct reticulate network between costae; sutural margin straight (Fig. 30).

Abdomen: penultimate segment transverse, sides slightly protruding postero-laterally, posterior margin slightly arched centrally; last segment triangular, slightly elongated.

Legs: simple

Male genitalia: small, long and slender; parameres small, closely fused to median lobe; apical end of median lobe slightly curved and pointed (Fig. 32E).

FEMALE

Size: length 7,5-12,0 mm; width 4,0-6,0 mm.

Elytra similar in form and colouration to male (may be slightly more elongated), only distinguishable by means of genitalia.

Discussion

Fåhraeus described this species from Natal and Bourgeois (1900) mentions a female specimen from Zaire. This may be a mistake as all the specimens that I have located were from the East coast of southern Africa.

L. (Haplolycus) perpusillus Kleine is synonymized with *L. zonatus*. The well illustrated literature, rostrum, elytral form, colouration, aedeagus form and similar distribution range leaves no doubt.

This species could easily be placed in the subgenus *Haplolycus* because of the elytral similarities in the males and females. This species seems to be closely related to *L. integripennis* Bourgeois and *L. staudingeri* Bourgeois, because of the similar aedeagal form.

Material examined

54 specimens were examined.

SOUTH AFRICA: CP. Algoa Bay (2 TMSA); Hogsback (1 TMSA). NAT. (6 MNHN); Howick, Pinetown (1 MNHN); Amanzimtoti (1 TMSA); Balgowan (1 SANC); Camperdown (1 TMSA); Durban (4 SANC;1 TMSA); Empangeni (1 SANC); Frere (1 SANC); Lake Kosi (1 SANC); Mack's Pass Ingwavuma (1 UPSA); Nkandla Forest (1 UPSA); Nyalazi Forest (4 TMSA); Pietermaritsburg (1 TMSA); Port St. John Pondoland (1 TMSA); Sarnia (1 TMSA); Sodwana Bay Nat. Pk. (1 UPSA); St. Lucia (1 SANC;2 TMSA); Tongaat (10 TMSA); Umtentweni (1 SANC); Wartburg (1 UPSA); Weenen (1 BMNH); Yellowwood Balgowan Dist. (1 TMSA); Zululand Dukuduku For. St. (1 TMSA); Zululand Ngoye (1 TMSA). TRANSKEI: Wilovale 12 km SE (1 TMSA).

Geographical distribution (Fig. 31)

South Africa (Cape and Natal), and Transkei.

Diagnosis

A very small species, easily distinguished by the colouration of the elytra (distinct black humero-scutellar area) and the form of the aedeagus.

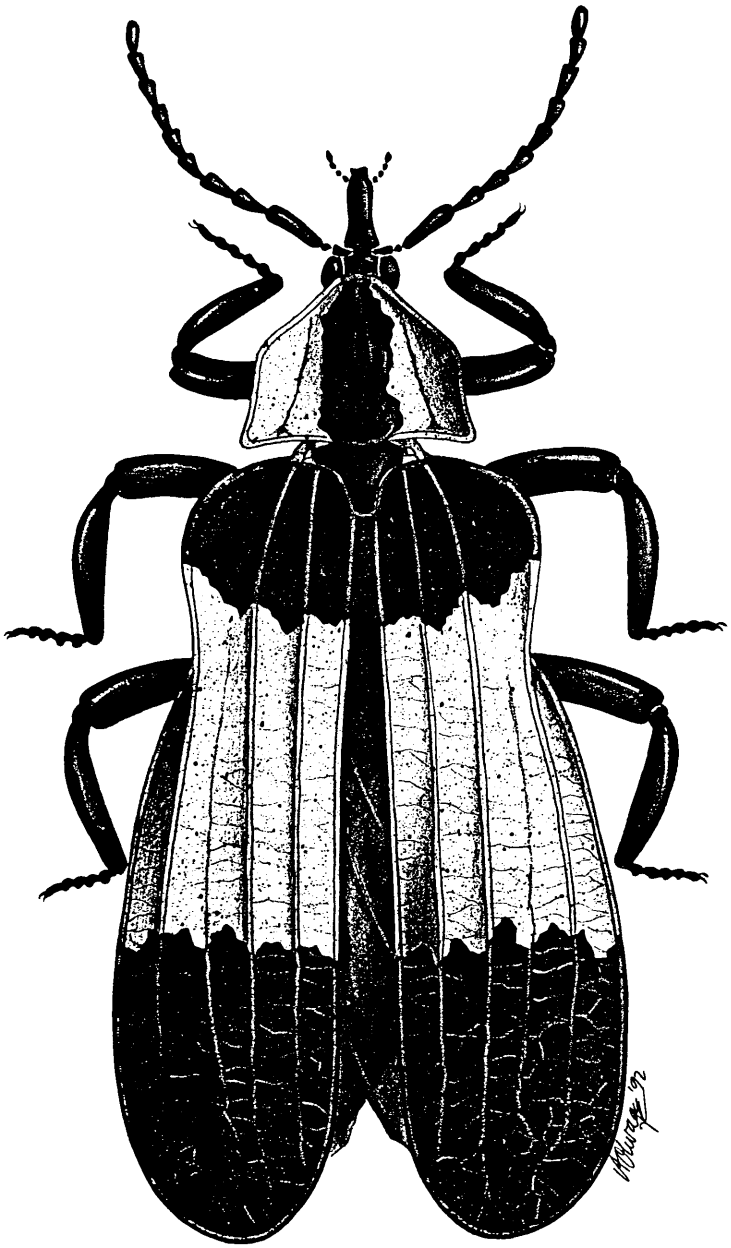


Figure 30: *Lycus (Lopholycus) zonatus* Fåhraeus.

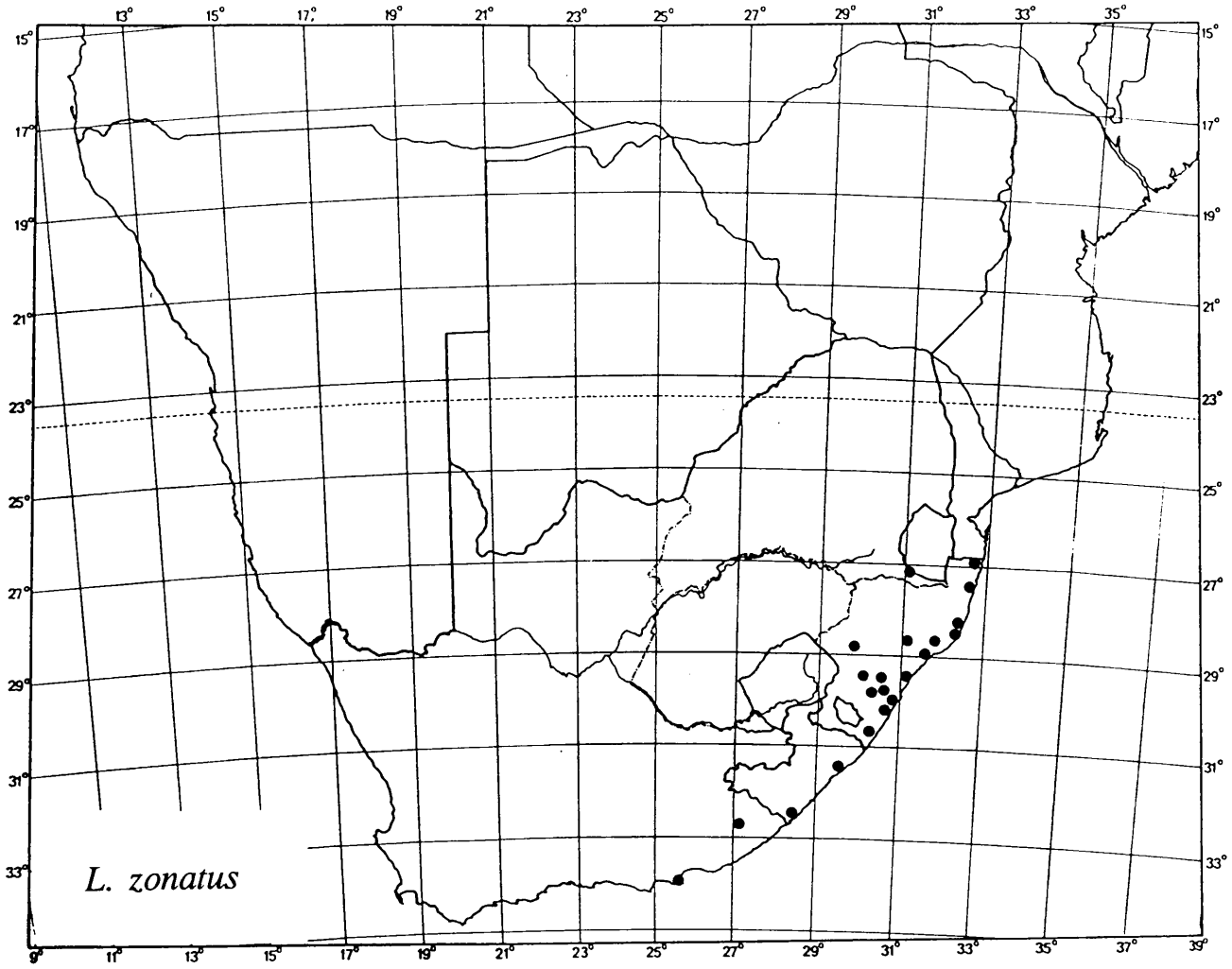


Figure 31: Distribution of *Lycus zonatus*.

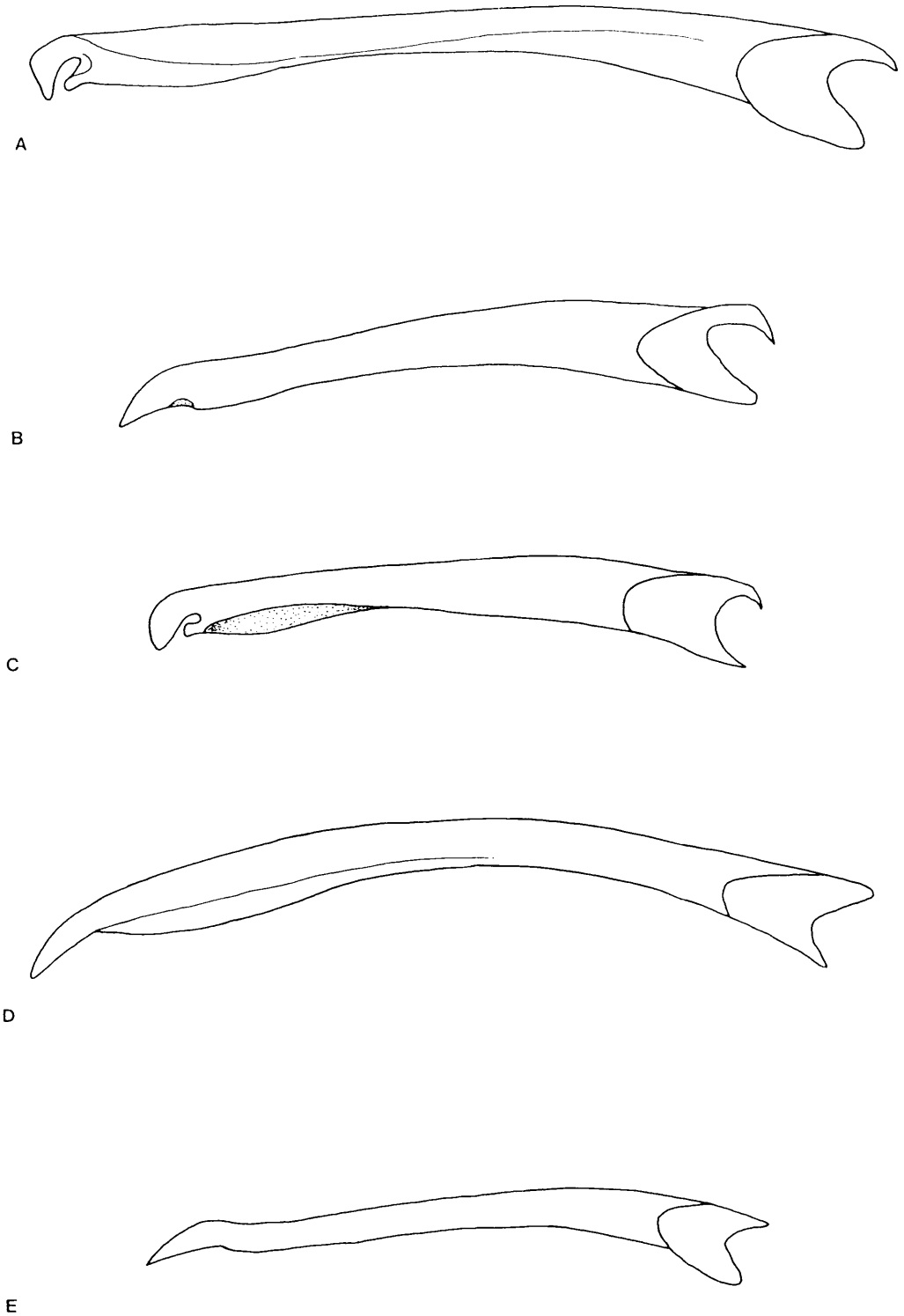


Figure 32A - E: Male genitalia: - **A** *L. haagi*. - **B** *L. integripennis*. - **C** *L. pusillus*. - **D** *L. staudingeri*. - **E** *L. zonatus*.

5.5.4 Species of the subgenus *Lycus*

Lycus (Lycus) alatus Kleine

(Figs 33, 34 & 50A)

Lycus alatus Kleine, 1935b: 425.

TYPE: PT (male): Cotype; Paratypus 585; Bulawayo (S. Rhodesia), 15.2.1925, Rhodesia Museum; ex. coll. R. Kleine, 12145; (ZMPA).

Redescription

MALE.

Size: length 19,0-23,0 mm; hum. width 14,5-17,0 mm; width 17,0-20,0 mm.

Head: a deep transverse depression between eyes, forming two pits.

Rostrum: long and slender; 2,15-2,20X distance between eyes.

Antennae: segments slender; 6-10 serrate; 3=4+5; 10<11.

Maxillary palpi: long and slender; last segment slightly broader, depressed apically.

Colouration: head, antennae, mesal part of pronotum and scutellar area black; edge of lateral humeral elevated dilations, sides from humeral area extending posteriorly, and posterior 1/4 of extremities black; two black marks extend mesally parallel to anterior humeral teeth, two marks extend parallel to meso-posterior inflation ("bloatation"); sides of pronotum, abdomen (varying from mesal part black, sides ochraceous) and elytra ochraceous (Fig. 33).

Pronotum: transverse, 1:1,65-1,75; anterior angles obtusely rounded, with anterior protruding, slightly ridged; posterior angles acute, pointed and reflexed backwards; sides slightly reflexed.

Elytra: glabrous; slightly longer than wide (sub-rounded form); humeral crest extended laterally (1/3 of length of elytra), reflexed upwards and inwards, forming two winged processes ending in a blunt "tooth"; edge of lateral margins with array of dense, long setae; latero-posteriorly elytra dilated, posterior sutural margins concave (to 1/3 way up), forming two oval posterior extremities; sutural margin forming an inflated, protrusion ("bloatation") meso-posteriorly; costae 1 and 2 distinct; 3rd obsolete, 4th indistinct, a fine irregular reticulate network between costae; lateral edge of elytra marginated, extending slightly upwards (Fig. 33).

Abdomen: penultimate segment rounded; last segment broadly triangular.

Legs: simple.

Male genitalia: short and stout; parameres thickened and clearly visible, closely associated with median lobe; median lobe ends in curved hook, with apex long and pointed ventrally (Fig. 50A).

FEMALE

No specimens traced.

Discussion

Four specimens were examined from south western Zimbabwe. The specimen from (ZMPA) coincides with the information given in the original description by Kleine (1935), and no mention was given in the description as to how many specimens were examined.

This species seems to be very similar to *L. kolbei* Bourgeois as both species are robust with similar aedeagi. The form of the elytra of *kolbei* differs completely (see Fig. 46).

Material examined

6 specimens examined.

ZIMBABWE: Bulawayo (1 SAMC, 4 TMSA).

Geographical distribution (Fig. 34)

South western Zimbabwe.

Diagnosis

This species cannot be confused with any other, the form of the elytra (rounded, length nearly equal to width), winged humeral area extending in "blunt teeth", elytra meso-posteriorly concavely arched, sutural bloatation, and aedeagus distinct.

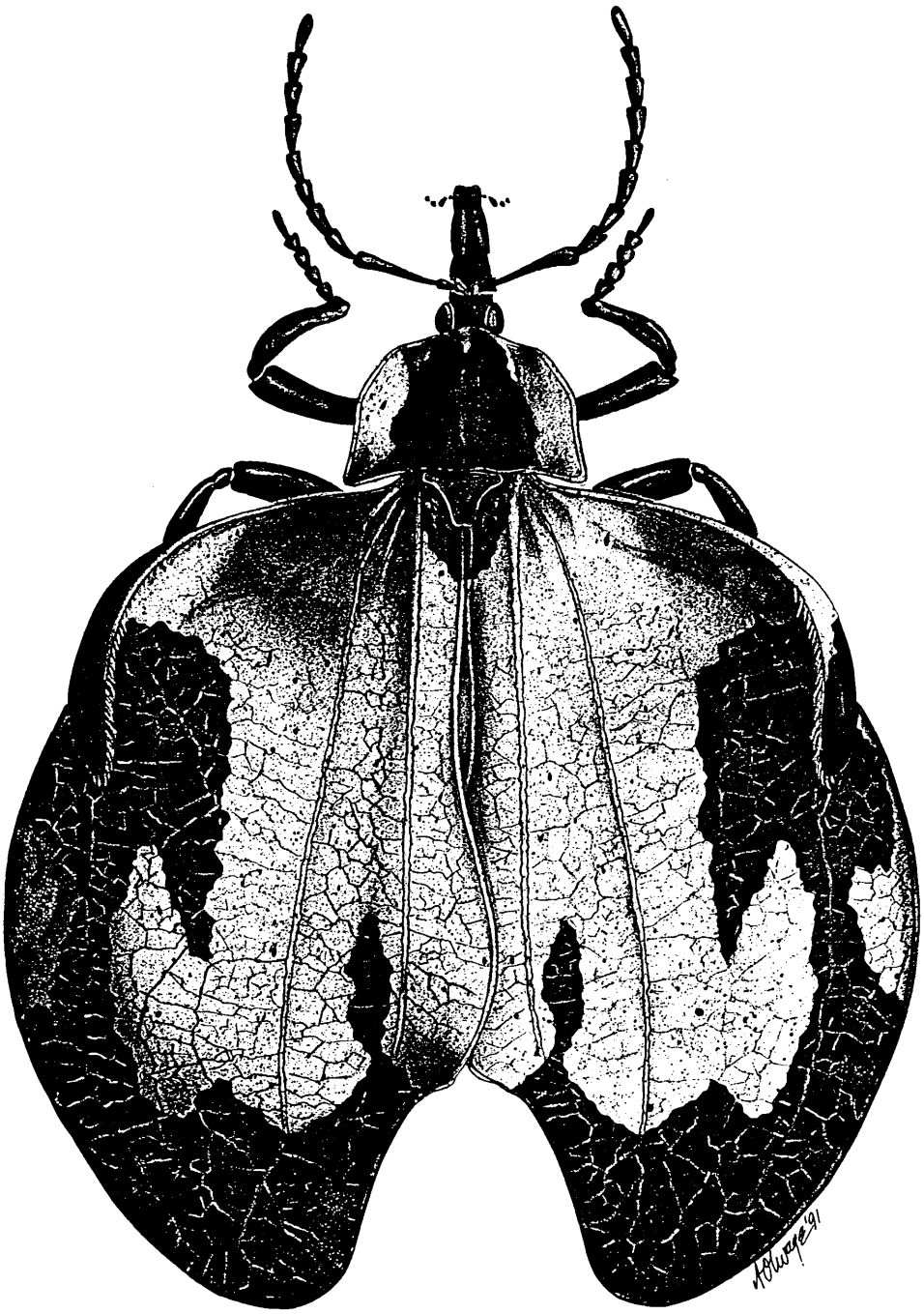


Figure 33: *Lycus (Lycus) alatus* Kleine.

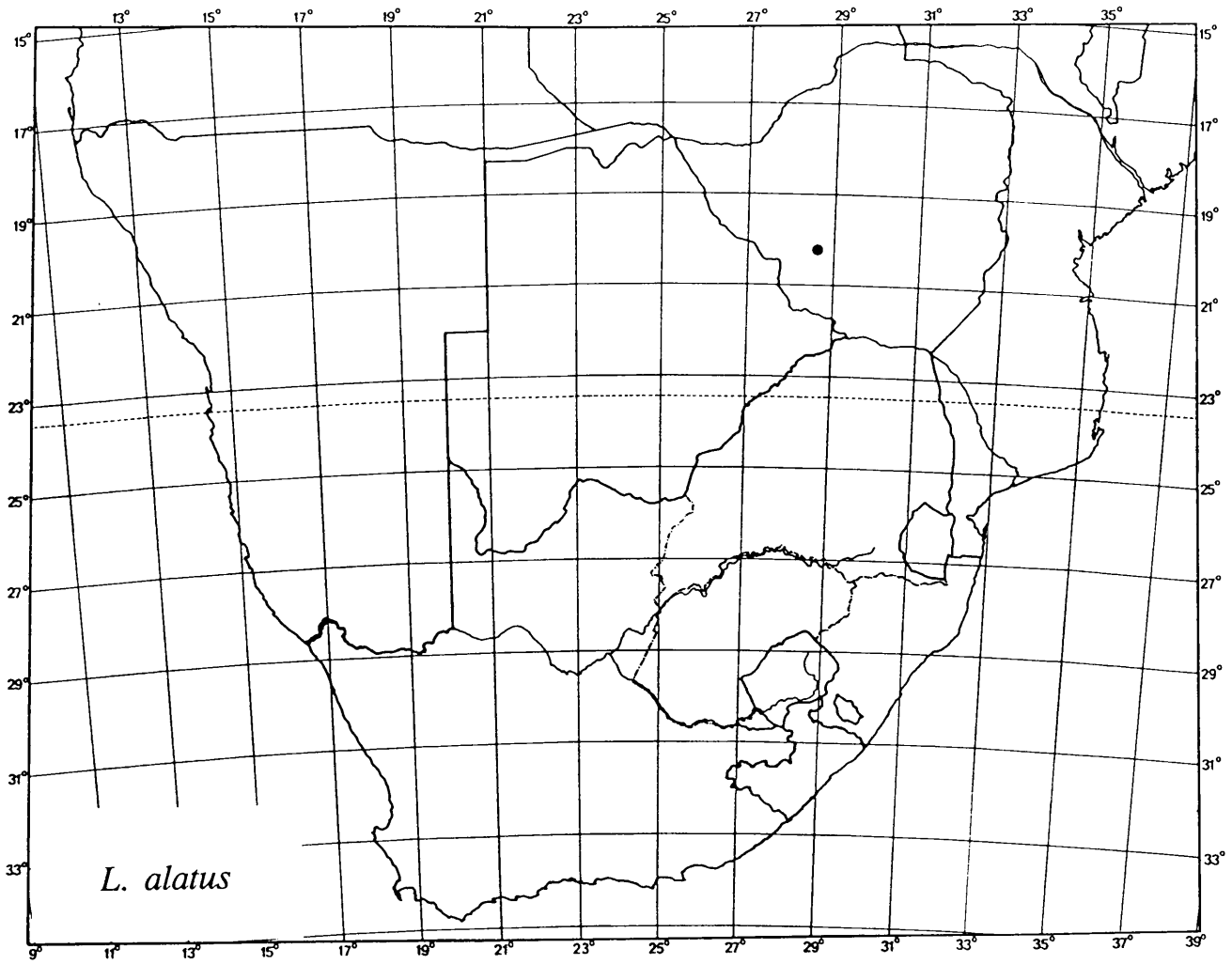


Figure 34: Distribution of *L. alatus*.

Lycus (Lycus) ampliatus Fåhraeus

(Figs 35, 36 & 50B)

Lycus ampliatus Fåhraeus, 1851: 432; Bourgeois 1883b: 632; 1901: 41; 1904: 89; 1908c: 107; Kleine 1933: 9; 1937: 80; Gomes-Alves 1947: 51; 1978: 18.

linnei (Bourgeois).Pic ?; Kleine 1937: 85; Gomes-Alves 1947: 48; 1959:107. **syn. nov.**

TYPE: No type specimens traced.

Redescription

MALE

Size: length 8,0-24,0 mm; hum. width 3,0-9,0 mm; width 7,0-18,0 mm.

Head: transversely depressed between eyes, forming two deep pits.

Rostrum: long and slender; 1,81-1,95X distance between eyes.

Antennae: 4-10 serrate; 3<4+5; 10<11.

Maxillary palpi: long and slender; last segment elongated, depressed apically.

Colouration: head, antennae (2nd and 3rd segments vary from ochraceous to black), scutellum, mesal part of pronotum, posterior 1/4 of elytra black (margin dentate), legs and thorax (varying from ochraceous to black) and abdomen (varying) black; rest of pronotum, abdomen and elytra ochraceous (Fig. 35).

Pronotum: transverse, 1:1,50-1,65; anterior angles obtuse,anterior slightly protruding and ridged; posterior angles acutely rounded and slightly reflexed back.

Elytra: glabrous; sides dilated (rounded form); slightly raised humeral crests; 4 visible costae, with a slight bloatation (bulge) medially; 1 row of reticulate cells between sutural margin and costae 1, with two rows between other costae (Fig. 35).

Abdomen: penultimate segment transverse, posterior margin slightly arched; last segment triangular.

Legs: simple.

Male genitalia: short, stout with distinct short and stout parameres; median lobe slightly curved, forked and pointed apically (Fig. 50B).

FEMALE

Size: length 8,0-16,0 mm; width 4,0-8,0 mm.

The elytra similar in colouration to male, form elongated.

Discussion

The type specimen according to Fåhraeus (1851) is from Natal. No "type" specimens could be found, but from the available determined material and from the literature this is clearly *ampliatus*. This species is abundant (in number of specimens) and has a wide distribution range.

The species *L. linnei* (Bourgeois) Pic, was not mentioned in Kleine's (1933) catalogue, but only in subsequent literature. Oliver (1790: 5) described the species *L. latissimus* (L.), but gave an illustration of what might be *L. linnei* (*ampliatus* ?). I could not locate Bourgeois or Pic's descriptions of *linnei*. A study of the literature and illustrations clearly indicates that *L. linnei* (Bourgeois) Pic must be a synonym of *L. ampliatus*. I have examined three examples from Zaire det. *L. linnei* (Bourgeois) by Bourgeois (1900), all being completely similar to *ampliatus*, in colouration, elytral and aedeagal form and distribution range.

Host plant: *Allium cepa* (Gomes-Alves 1978:18).

Material examined

950 specimens examined.

ANGOLA: (Huila) (1 MNHN); Afrique Orient Angl. Lesammise Rendile (2 MNHN); Huila 14km SAE Da Bandeira (2 TMSA); Huila Distr. Chibemba (5 SANC); Sasa Bandeira Huila (1 SMWH). BOTSWANA: Kanye 35 km SE on Lobatse Rd (1 BMSA); Shakawe waste ground (1 TMSA). KENYA: Kibwezi (2 ISNB). Shimba For. Res. (5 BMNH). MALAWI: "Nyasaland" Blantyre (6 BMNH); Chiromo (13 BMNH); Lower Shire Valley nr Chikawa (3 BMNH); Mlanje (11 BMNH). MOZAMBIQUE: Quelimane (1 ISNB). NAMIBIA: Chaub (1 SAMC); Dehli 96 Outjo (2 SMWH); Gobiwater 12m/s N Grootfontein (5 BMNH); Kombat (5 BMNH); Namib Halenburg S (6TMSA); Ondongua 52 Km SE (4 SANC); Otjimbumbe Kunene (2 SAMC); Swakopmund (1 SANC); Tsumeb (2 SANC); Windhoek (2 SANC, 1 UPSA). SOUTH AFRICA: CP. Bathurst distr. (3 TMSA); Ceres (1 TMSA); "Algoa Bay", Port Elizabeth (4 TMSA); Kuruman (11 UPSA); Resolution Albany Distr. (1 TMSA); Riviersonderend, Oudebosch (1 SAMC); Swartberg Pass (3 SANC); Swellendam distr. (2 SAMC); Villierdorp 8 km S (3 SANC); Willomore (11 TMSA); NAT. Camperdown (2 TMSA); Cathedral Peak Drakensberg (9 BMNH); Durban (9 SAMC, 1 SANC, 2 TMSA); Frere (1 SAMC); Kosi Bay (7 SANC); Leeukop Nat Res. (14 UPSA); Mfongosi (4 SAMC); Mkuzi (2 SANC); Pietermaritsburg (1 TMSA); St. Lucia (1 SANC); Tongaat (1 TMSA); Umbilo (2 SANC); Umfolozi river (1 TMSA); Umzinto, Vernon Crookes Nat. Res. (13 SANC); Weenen (2 BMNH); OFS. Bethlehem (2 SANC); Bloemfontein (1 UPSA, 64 BMSA); Boshof, Voorspoed 1585 (38 BMSA); Bothaville (1 BMSA, 5 TMSA); Brandfort, Glen Res. Farm (11 BMSA); Clarens (4 SANC); Cornelia (2 UPSA); Fouriesburg (6 SANC); Harrismith (7 BMSA); Heilbron (2 UPSA); Hennenman (1 BMSA); Hoopstad, Doornbult 1310

(41 BMSA); Ladybrand (8 BMSA); Parys (2 BMSA); Petrusburg (2 BMSA); Standerton (1 UPSA); Thaba Nchu 30 Km SSW on Dewetsdorp Road (7 BMSA); TVL: Agatha (2 UPSA); Barberspan nr Sannieshof (2 TMSA); Barberton (7 SANC, 11 TMSA, 1 UPSA); Breyten (1 UPSA); Brits (5 UPSA); Bronkhorstspruit (4 UPSA); Cullinan (1 UPSA); Delmas (1 UPSA); Doordraaidam Nat. Res. (3 SANC); Doringkloof (1 UPSA); Eersterus (1 UPSA); Ellisras Distr. Mogol Nat. Res. (4 SANC); Groblersdal (2 SANC, 2 UPSA); Groot Marico (1 TMSA); Hartbeespoort (1 UPSA); Hazyview (3 UPSA); Heidelberg (1 SANC); Irene (1 SANC); Johannesburg (1 UPSA); KNP Nwanedzi (7 TMSA); KNP Pretoriuskop (1 SANC, 1 UPSA); KNP Skukuza (5 SANC, 2 UPSA); KNP Tekwane (3 UPSA); KNP Tshokwane (18 SANC); Krugersdorp (1 UPSA); Loskopdam 20km SE (1 SANC); Loskopdam Nat. Res. (30 SANC, 9 UPSA); Louis Trichardt (3 SAMC); Malati Park, Naboomspruit (23 TMSA); Malelane (4 TMSA, 1 UPSA); Mariepskop (2 TMSA); Marikana (2 UPSA); Messina (1 UPSA); Metsimhlaba (1 TMSA); Middelburg (1 SANC, 2 UPSA); Moordrift (1 TMSA); Naboomspruit (3 SANC, 18 TMSA); Nelspruit (1 SANC, 5 UPSA); Nwatindlopfu (3 SANC); Nylstroom (3 SANC); Nylsvlei Nat. Res. (36 SANC, 1 UPSA); Percy Fyfe Nat. Res. (2 SANC); Phalaborwa (1 UPSA); Pienaarsriver (2 TMSA); Piet Retief (8 TMSA); Pietersburg (1 SAMC, 4 SANC, 10 UPSA); Platriver Waterberg distr. (14 TMSA); Potchefstroom (3 SANC, 1 UPSA); Potgietersrus (1 UPSA); Pretoria (3 SANC, 16 TMSA, 49 UPSA); Rietfontein (1 TMSA); Roodeplaatdam (1 SANC, 5 TMSA, 2 UPSA); Rust de Winter (2 UPSA); Rustenburg (22 SANC, 3 TMSA); Sabie (1 UPSA); Shilouvane (2 TMSA); Silverton (1 UPSA); Skeerpoort (1 UPSA); Soutpan, 25 mls N Pta; (2 TMSA, 1 UPSA); Soutpansberg (2 TMSA); Strijdom Tunnel (7 SANC); Swartruggens (3 TMSA); Tawoomba, Warmbad (11 SANC); Thabazimbi (4 UPSA); Thabazimbi 20 Km NE (11 UPSA); Thabazimbi Tweeloopfontein 50 Km NW (9 UPSA); Trichardt (1 UPSA); Tzaneen (1 UPSA); Vaalwater (5 UPSA); Wagendrift (3 UPSA); Warmbad (1 SANC, 2 UPSA); Witbank (3 UPSA); Witriver (1 TMSA); Woodbush (2 UPSA); Zeerust (1 UPSA). SWAZILAND: Ranches (1 SANC). TANZANIA: (1 ISNB); Dar-Es-Salaam (1 BMNH, 3 ISNB, 5 TMSA); Terr. Kigon (2 MRAC). ZAIRE: (Congo) (18 ISNB); Albertville (1 ISNB); Banana (1 ISNB); Boma (1 ISNB); Boma-Banana (18 ISNB); Busu Modjelo (1 ISNB); Leopoldville (1 ISNB); Lubutu-Masua (1 ISNB); Zambi (1 ISNB). ZAMBIA: "NW Rhodesia" (1 BMNH); Mwegwa (2 BMNH); Namwala (2 BMNH). ZIMBABWE: Maranka Res.(2 TMSA); Matopo Hills (1 BMNH); Mt. Selinda (1 TMSA); Salisbury (5 BMNH, 2 TMSA); Umtali (1 BMNH, 3 SAMC, 1 SANC).

Geographical distribution (Fig. 36)

Angola, Botswana, Central African Republic, Ethiopia (Abyssinie), Guinea-Bissau, Kenya, Malawi, Mozambique, Somalia, South Africa (Cape, Natal, OFS and Tvl), Swaziland, Tanzania, Zaire, Zambia, Zanzibar and Zimbabwe.

Diagnosis

Distinguished by the rounded elytral form with elevated humeral area, colouration as well as the form of the aedeagus.

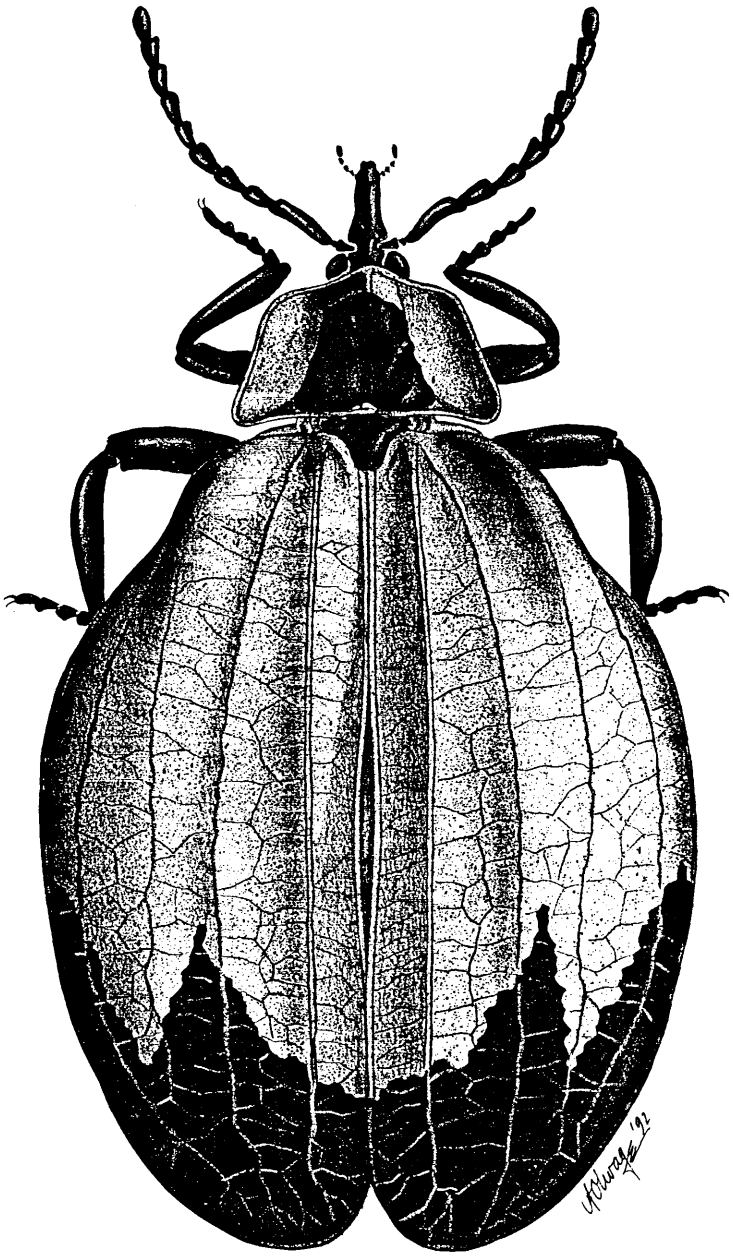
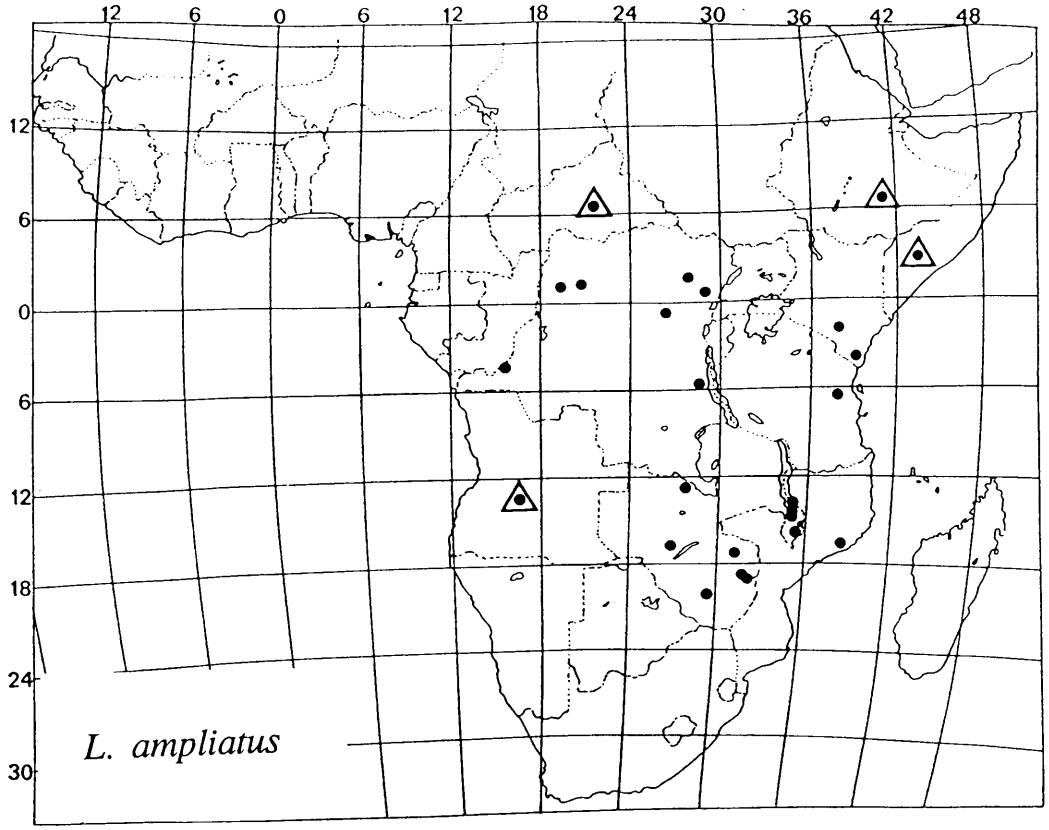


Figure 35: *Lycus (Lycus) ampliatus* Fåhraeus.



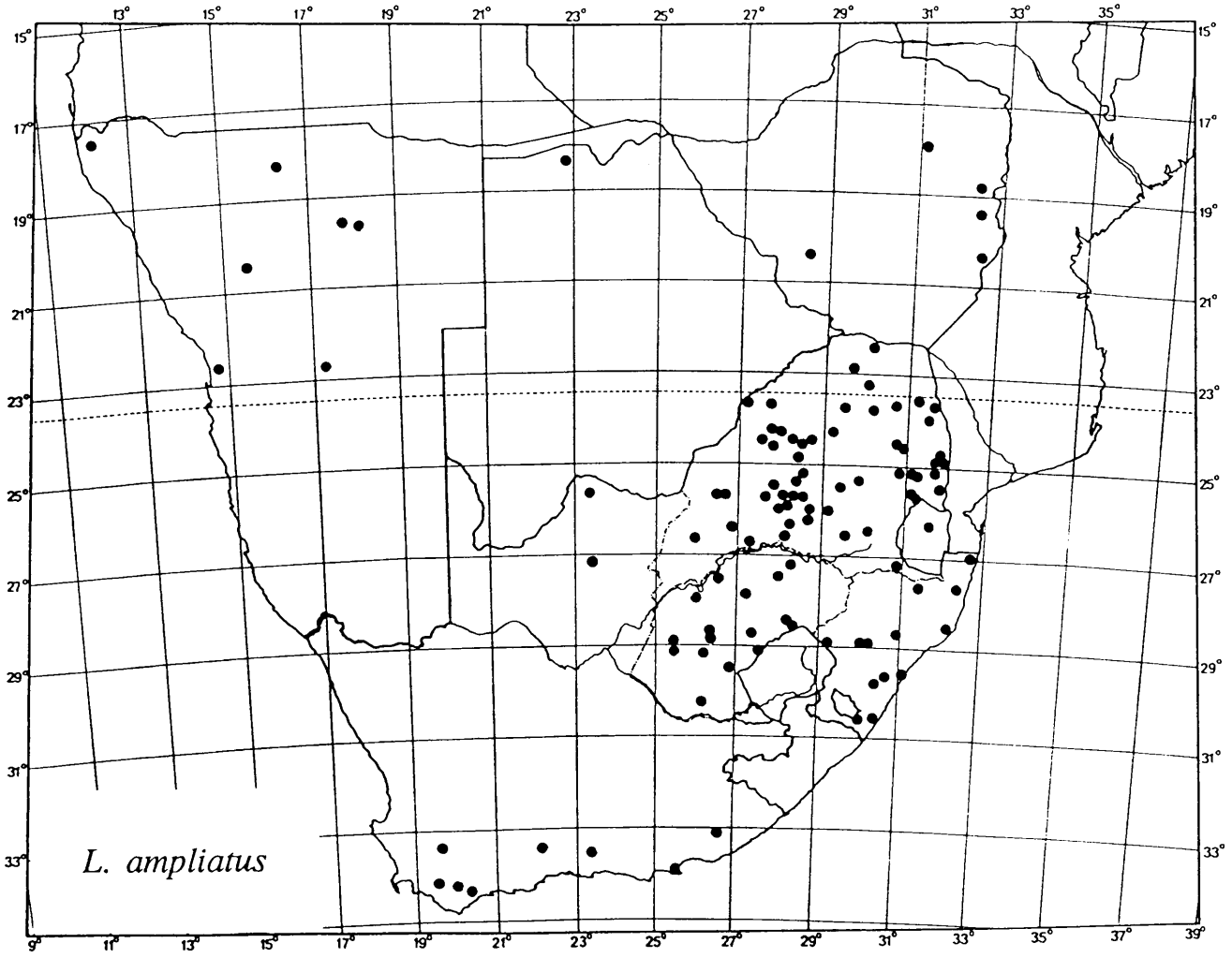


Figure 36A & B: Distribution of *Lycus ampliatus*.

Lycus (Lycus) duvivieri Bourgeois

(Figs 37, 38 & 50C)

Lycus duvivieri Bourgeois, 1900: 142; Kleine 1933: 9; 1937: 82.

TYPE: 1HT (male); 4PTS (female): Congo belge, Albertville, J Duvivier (ISNB).

Redescription

MALE

Size: length 16,0-24,0 mm; hum. width 4,5-5,0 mm; width 14,0-20,0 mm.

Head: transversely depressed between eyes, forming two deep pits.

Rostrum: long and slender, 1,80-2,15X distance between eyes.

Antennae: 4-10 serrate; 3<4+5; 10<11.

Maxillary palpi: long and slender, last segment elongated, slightly depressed apically.

Colouration: head, antennae, scutellar area (varying, ochraceous - black), mesal part of pronotum, abdomen (ochraceous, except last segment black), posterior 1/3 -1/2 of elytra black (dentate margin); rest of pronotum, elytra and abdomen ochraceous (Fig. 37).

Pronotum: transverse, 1:1,60-1,65; anterior angles obtuse and scalloped; anterior margin slightly protruding and ridged; posterior angles acute and slightly reflexed; sides reflexed.

Elytra: glabrous; sides dilated (circular form); humeral crests slightly raised (swollen); rest of elytra slightly depressed (flattened); costae 1, 2 and 4 prominent, 3 visible, obsolete in humeral area; 2 rows of irregular reticulate cells between costae; sutural margin slightly extended mesally (overlapping); extremities ovally rounded, slightly distant (Fig. 37).

Abdomen: penultimate segment transverse, posterior sides are slightly extended, protruding latero-posteriorly, posterior margin straight; last segment stoutly triangular.

Legs: simple

Male genitalia: short and stout (robust); parameres stout and distinct; median lobe furcate, hooked and apically pointing downwards (Fig. 50C).

FEMALE

Size: length 11,0-19,0 mm; width 6,0-9,0 mm.

Elytra elongated; colouration similar to male.

Discussion

According to Bourgeois (1900) this species is very similar to *L. ampliatus* Fåhraeus. However, the form of the aedeagus is completely different. On the whole, this is a much larger species with elytra only superficially similar. The elytra are more depressed in *duvivieri* with no "bloatation" mesally on sutural margin.

Material examined

176 specimens examined.

BOTSWANA: Moremi Res. (97 BMNH). MALAWI: S Nkopola For. Res (1 TMSA). MOZAMBIQUE: "L.M." Maputo (1 TMSA). NAMIBIA: Okahandja (4 SANC); Windhoek (8 SANC); Rietfontein, 23 mls SW Grootfontein (23 BMNH). SOUTH AFRICA: NAT. Dukuduku For. Station (3 TMSA); Kwazulu 35 Km N Jozini Ndumu Rd (1 SANC); St Lucia (2 SANC); TVL. Agatha (1 UPSA); Naboomspruit (1 SANC); Nylsvlei (1 UPSA); Pretoria (2 SANC, 1 UPSA); Saartjiesnek (11 UPSA); Thabazimbi (1 UPSA); Waterberg Farm 223 (7 TMSA); Zoutpan (5 TMSA). ZIMBABWE: Sebakwe (1 TMSA).

Geographical distribution (Fig. 38)

Botswana, Malawi, Mozambique, Namibia, South Africa (Natal, Tvl), Tanzania, Zaire and Zimbabwe.

Diagnosis

Very easily distinguished by the dilated, depressed and rounded form of the elytra, and stoutly hooked aedeagus.

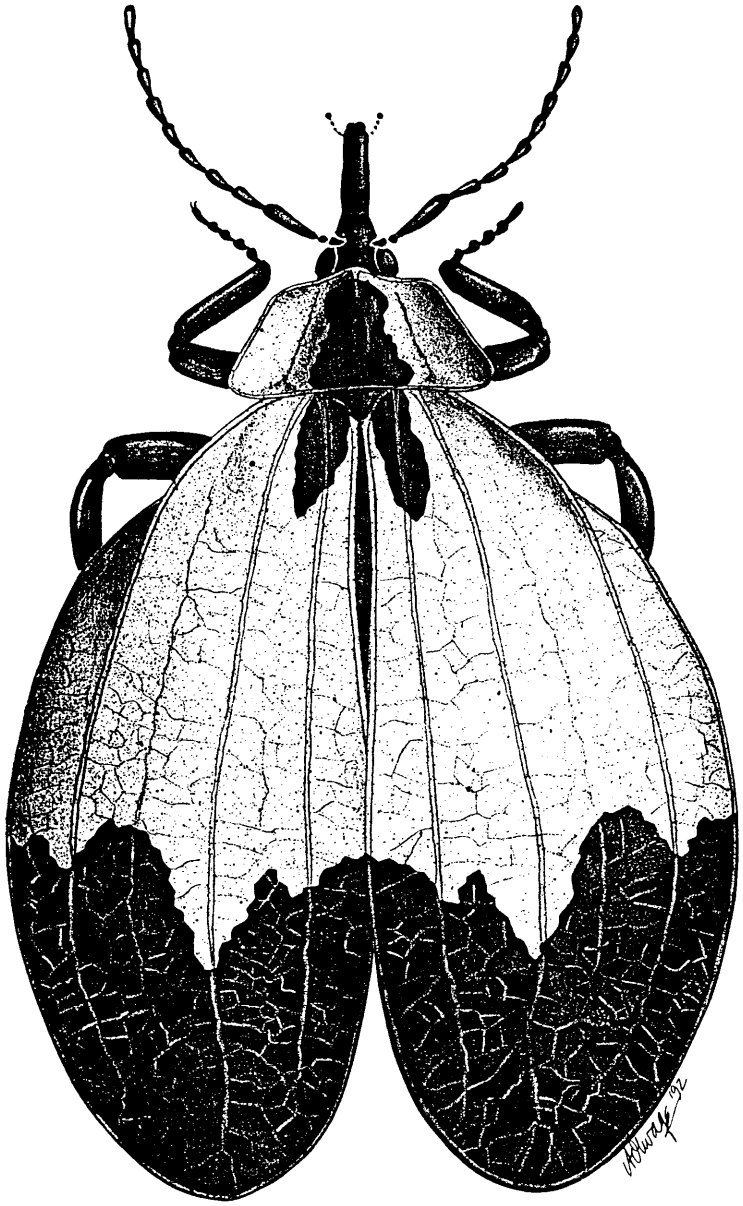
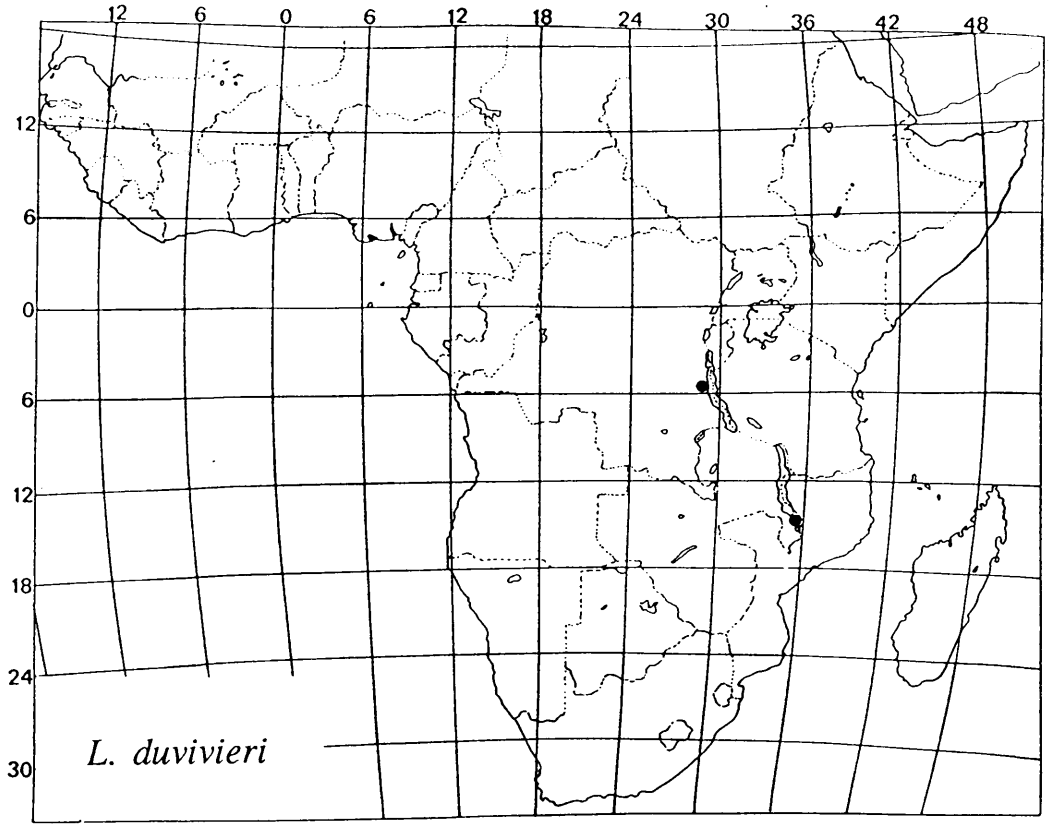


Figure 37: *Lycus (Lycus) duvivieri* Bourgeois.



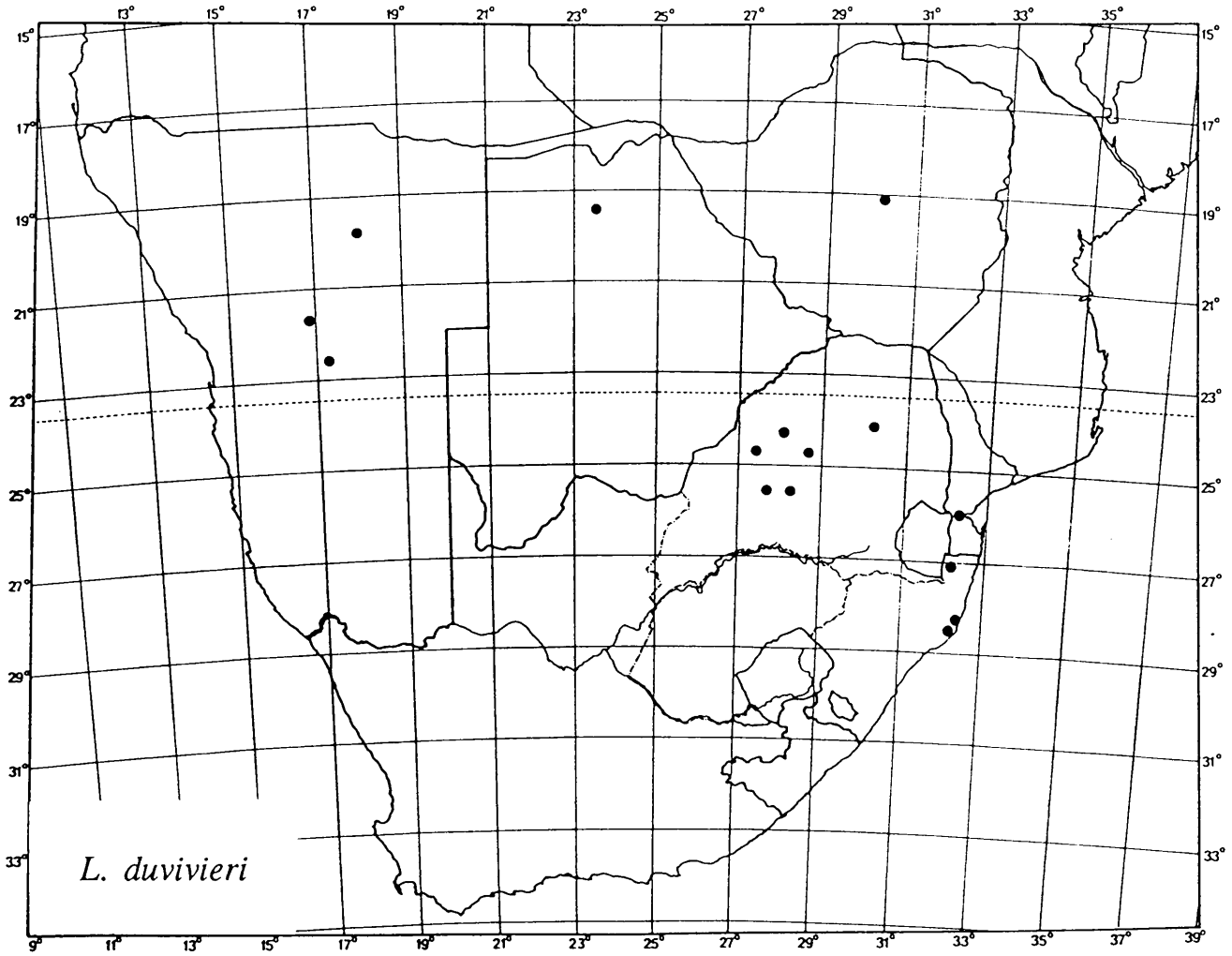


Figure 38A & B: Distribution of *Lycus duvivieri*.

Lycus (Lycus) elevatus Guérin-Méneville

(Figs 39, 40 & 50D)

Lycus elevatus Guérin-Méneville, 1847: 228; Fåhraeus 1851: 428; Bourgeois 1883a: 61; Kleine 1933: 9; Gomes-Alves 1967: 49.

TYPE: No types traced.

Redescription

MALE.

Size: length 12,0-18,0 mm; width 7,0-12,0 mm.

Head: deeply depressed between eyes, forming two deep pits.

Rostrum: long and slender, 2,10- 2,60X distance between eyes.

Antennae: slender, 5-10 serrate; 3<4+5; 10<11.

Maxillary palpi: slender, with last segment broadly depressed apically.

Colouration: head, antennae, legs and thorax black, abdomen (varying from ochraceous, to black mesally with sides ochraceous); scutellar area, mesal part of pronotum and posterior 1/6 of elytra black; lateral margins of elytra ("trough") edges with black markings (Fig. 39).

Pronotum: transverse 1:1,60-1,80; anterior angle obtuse, (transverse-semicircular form); anterior sinuately ridged; posterior angles acutely rounded; slightly reflexed.

Elytra: glabrous; anterior 2/3 dilated (circular form), lateral margins extended, curved upwards and inwards (trough-shaped), with slight blunt, curved extensions latero-posteriorly over elytra; posterior ovally elongated; extremities rounded, slightly distant; costae 1 and 2 prominent, 3rd and 4th costae visible in black posterior markings (elsewhere obsolete); a fine network of reticulate cells visible between costae; sutural margin slightly convexly, extending mesally (Fig. 39).

Abdomen: penultimate segment transverse, posterior margin arched mesally; last segment triangular.

Legs: simple.

Male genitalia: aedeagus short, stout and ending in a stout, right-angled hook with apex blunt; parameres short, stout, visible but closely associated with median lobe (Fig. 50D).

FEMALE

Size: length 11,5-13,5 mm; width 5,0-6,5 mm.

Elytra elongated, colouration similar to male, except no lateral black markings on elytra.

Discussion

This species is very similar to *L. poultoni* Bourgeois. The aedeagus is similar but the form and colouration of the elytra are different. Both species show hardly any variation.

Bourgeois (1883) described *elevatus* as a typical species of the subgenus *Chlamydolycus* group (b). At present *elevatus* is placed under the subgenus *Lycus* and *poultoni* under *Chlamydolycus*, which demonstrates the confusion that exists with the subgeneric classification.

Material examined

24 specimens examined.

SOUTH AFRICA: CP. Grootvlei (4 SAMC); Willowmore (7 TMSA); OFS. (5 females, 4 males ISNB); TVL. (4 MNHN).

Geographical distribution (Fig. 40)

South Africa (Cape, OFS, Tvl) and Natal (Guérin-Méneville 1847).

Diagnosis

L. elevatus is recognized by the "trough-shaped", lateral, dilated margins of the elytra, the conspicuous black markings and by the short and stout aedeagus.

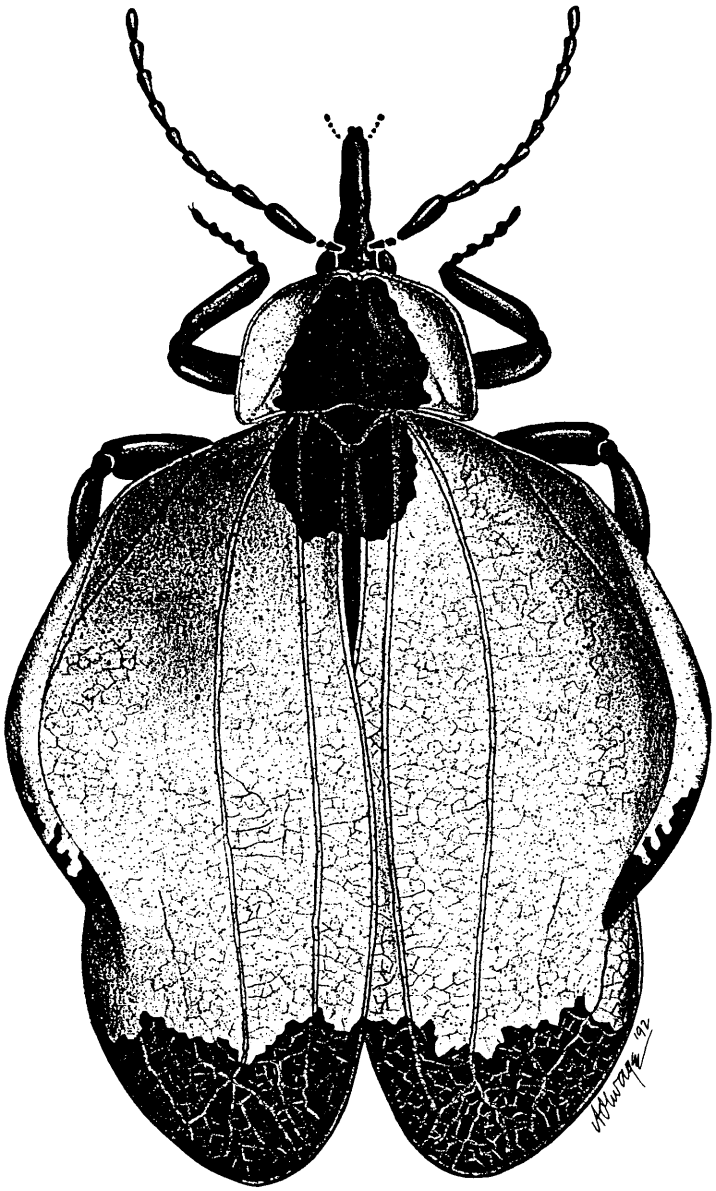


Figure 39: *Lycus (Lycus) elevatus* Guérin-Méneville.

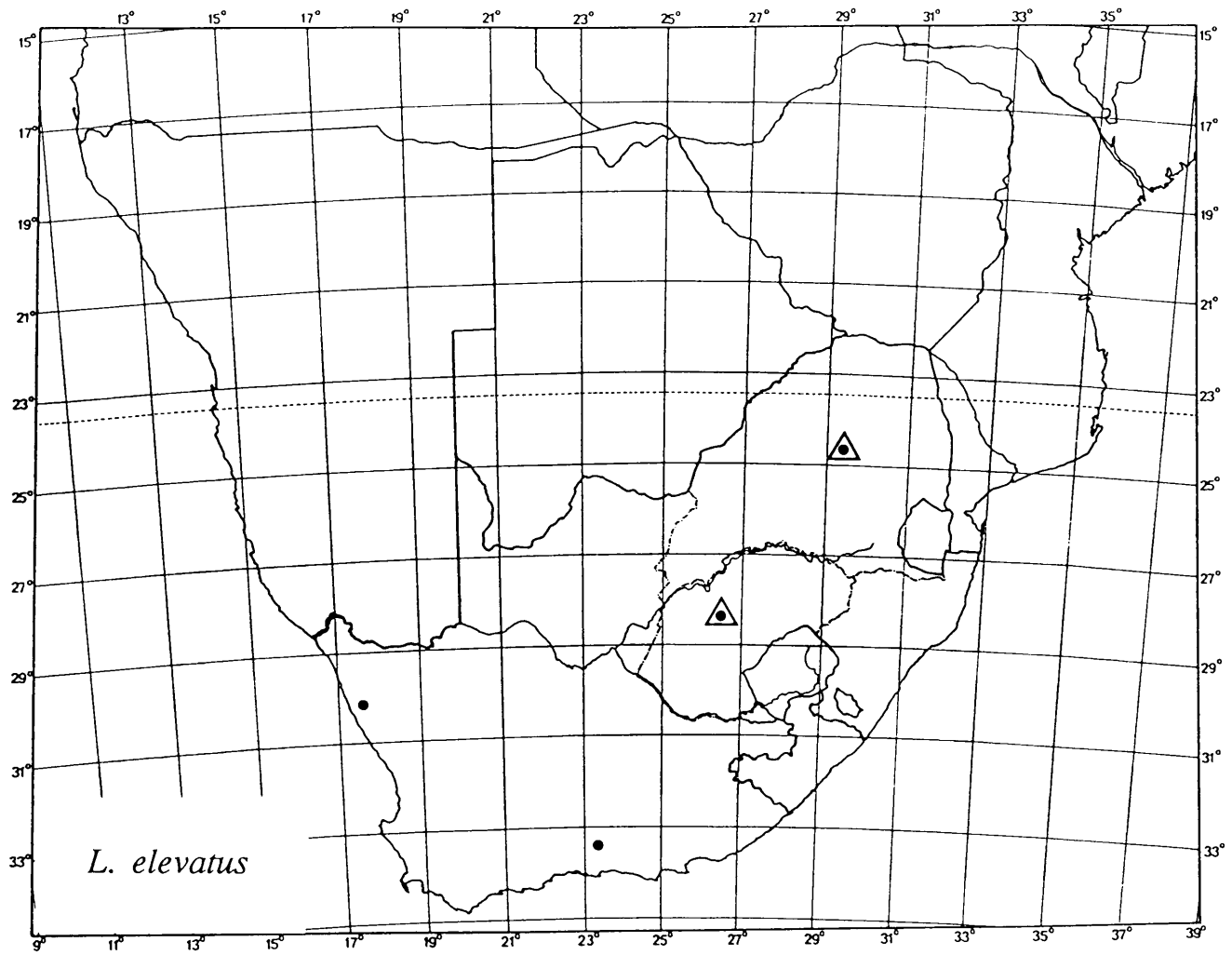


Figure 40: Distribution of *Lycus elevatus*.

Lycus (Lycus) foliaceus Dalman

(Figs 41 & 50E)

Lycus foliaceus Dalman, 1817: 26; Guérin-Méneville 1847: 223; Murray 1868: 323; Bourgeois 1901: 39; 1905: 194 (v. *xanthomelas*); Pic 1925a: 3; Kleine 1933: 9; Pic 1933a: 122 (v. *notaticollis*); Kleine 1937: 84; Gomes-Alves 1962: 44.

senegalensis Castelnau, 1840: 262.

xanthomelas Dalman, 1817 ♀: 26; Murray 1868: 324; Waterhouse 1879: 17.

TYPE: *L. foliaceus*: HT (male): Sierra Leone, Afzelius; 161/89 (NHRS).

No types of *senegalensis* and *xanthomelas* could be traced.

Redescription

MALE

Size: length 15,0-23,0 mm; hum. width 9,0 mm; width 8,0-16,5 mm.

Head: transversely depressed between eyes, forming two pits.

Rostrum: long and slender, 2,30-2,40X distance between eyes.

Antennae: 5-10 serrate; 3>4+5; 10<11.

Maxillary palpi: long and slender with apical segment elongated, slightly broader and depressed apically.

Colouration: head, antenna, scutellar area (varying from ochraceous to black), mesal part of pronotum and abdomen, legs and posterior 1/3 of elytra (2 deeply indented, vertical black marks) black; rest of abdomen, pronotum and elytra ochraceous.

Pronotum: transverse; 1:1,60-1,65; anterior angles obtuse and scalloped; anterior slight protruding and ridged; posterior angles acutely extended.

Elytra: glabrous; sides dilated (transversely rounded form); humeral area with raised (swollen) crests; sutural margin with slight bloatation centrally, slightly concave: posterior extremities slightly curved mesally (inward) on sutural margin, overlapping; 4 visible costae, 1st prominent; 1 row of reticulate cells between sutural margin and costa 1, 2 rows between 1st, 2nd, 3rd and 4th.

Abdomen: penultimate segment transverse, lateral margins slightly protruding posteriorly; last segment triangular, slightly elongated.

Legs:simple

Male genitalia: parameres closely fused to median lobe, hardly visible; median lobe long, rounded (hood-shaped), furcate, pointing downwards at apex (Fig. 50E).

FEMALE

Size: length 13,5-19,5 mm; width 5,0 mm.

Elytra subparallel (Gomes-Alves 1962). No specimens examined.

Discussion

A very large species with a wide distribution range. Many wrongly determined material was found in collections. Only a few specimens were examined, and none from southern Africa, which leaves this area in doubt as to included in the distribution range.

The species *L. flammeatus* Bourgeois may be considered as a synonym, because of (a) the similarity in elytra form and colouration, (b) similar aedeagal form and (c) similar distribution range. This has only been observed from illustrated literature record, therefore no further statements can be made.

Material examined

81 specimens were examined.

ZAIRE: Batasiala (2 ISNB); Kele-luzi (6 ISNB); Kibenze (6 ISNB); Lebo, Sundi (1 ISNB); Lolo Damvu (4 ISNB); R de maba ia (2 ISNB); Stanleyville (1 ISNB); Tsele (58 ISNB).

Geographical distribution (Fig. 41)

Angola, Cameroun, Central African Republic, Congo, Ethiopia (Abyssinie), Gabon, Nigeria (Upper Calabar), Sierra Leone and Zaire. (According to Kleine (1937) South Africa (Tvl), but not verified).

Diagnosis

A very large species, with elytra extremely dilated laterally (rounded form) and distinct black apical colouration (2 black vertical marks) and aedeagus with a distinctly rounded apex.

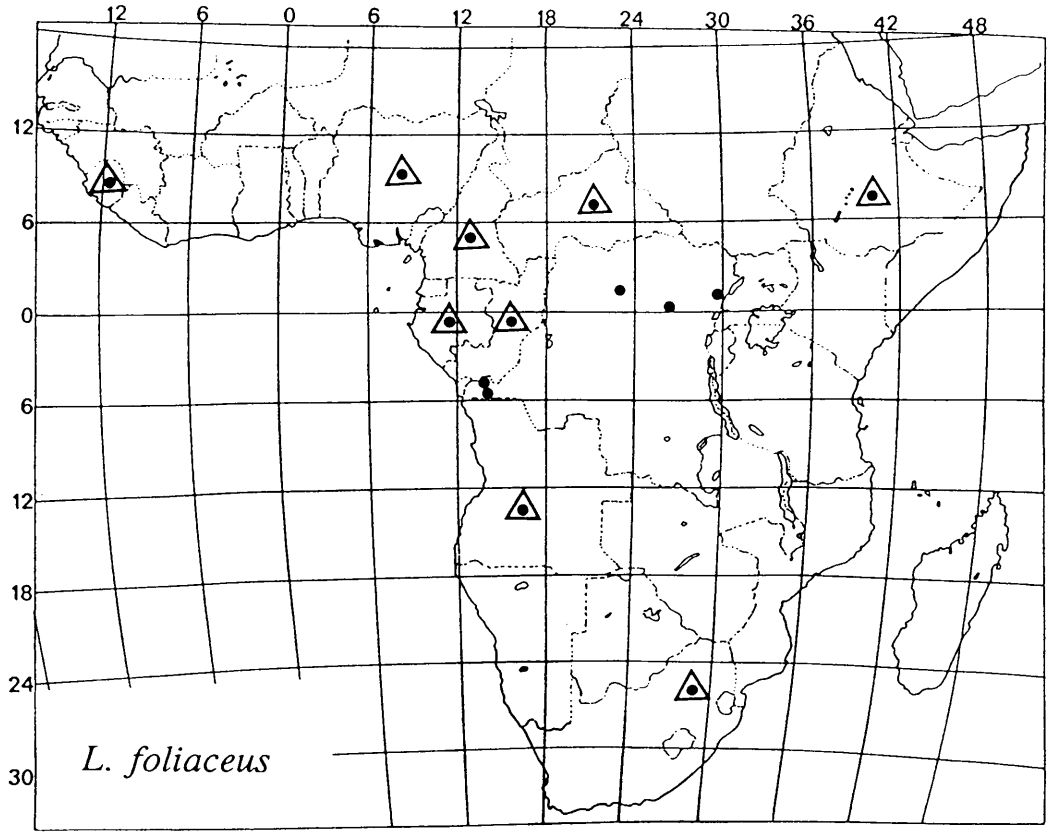


Figure 41: Distribution of *Lycus foliaceus* Dalman.

Lycus (Lycus) hamatus Guérin-Méneville

(Figs 42, 43 & 51A)

Lycus hamatus Guérin-Méneville, 1847: 229; Fåhraeus 1851: 433; Bourgeois 1901: 41; Kleine 1933: 10.

TYPE: No types traced.

Redescription

MALE.

Size: length 10,0-15,5 mm; width 7,0-12,5 mm

Head: deeply depressed between eyes, forming two pits.

Rostrum: very long and slender; 2,80-2,95X distance between eyes.

Antennae: 4-10 serrate; 3>4+5; 10<11.

Maxillary palpi: long and slender, last segment depressed apically.

Colouration: antennae, head, mesal part of pronotum, scutellar area, posterior 1/5 of elytra black (margin deeply dentate); extremities of humeral spines may/not be black; rest of elytra and pronotum ochraceous; abdomen varying (from completely ochraceous to mesally black and sides ochraceous) (Fig. 42).

Pronotum: nearly as long as broad (hood-shaped), 1:1,21-1,27; anterior and latero-anterior angles greatly obtuse; anterior ridge (may be slightly concave); posterior angles acutely pointed; sides reflexed upwards.

Elytra: glabrous; subrounded- subsquare; humeral area dilated, extending in long, slender spines (first curving mesally (inwards) and then laterally (outwards)); sutural margin straight; rounded extremities touching apically (sutural angle roughly perpendicular); costae 1 and 2 distinct, 3rd obsolete, 4th visible (curving into humeral spine); a fine reticulate network between costae (Fig. 42).

Abdomen: penultimate segment transverse, posterior margin concavely arcuate; last segment elongated and slender.

Legs: simple.

Male genitalia: extremely long and slender; median lobe slightly curved and pointed apically; parameres very small and fused to median lobe (Fig. 51A).

FEMALE

Size: length 10,5-13,0 mm; width 4,5-7,0 mm.

Elytra not dilated, slender without humeral spines. Colouration and form of pronotum same as in male.

Discussion

One specimen labelled "type" with associated det. label by Guérin-Méneville (1847), was traced from (ISNB), but it cannot be the holotype, since it is much smaller than recorded in the original description. It seems as if only one male specimen was examined in the original description (length = 14mm). The locality information is the same.

This species is very similar to *inornatus* Bourgeois, and may be closely related (discussed later).

Material examined

36 specimen examined.

SOUTH AFRICA: NAT. "type" (1 ISNB); (1 MNHN); Durban, Dumisa (2 MNHN); Durban (2 MNHN, 1 SANC); Durban, Umbilo (1 SANC); Frere (1 SANC); Umzinto, Vernon Crookes Nat. Res. (11 SANC); TVL. Pretoria (1 SANC); Soutpansberg (1 MNHN); Woodbush (4 TMSA). TANZANIA: Kondoa (2 MNHN). ZIMBABWE: Umtali (1 SAMC).

"Minastune" (5 TMSA). No locality (1 SANC; 1 SAMC).

Geographical distribution (Fig. 43)

South Africa (Natal and Tvl), Tanzania and Zimbabwe.

Diagnosis

This species is easily recognized by the ovally-rounded elytra with associated long, slender and curved spines, and the long and slender aedeagus.

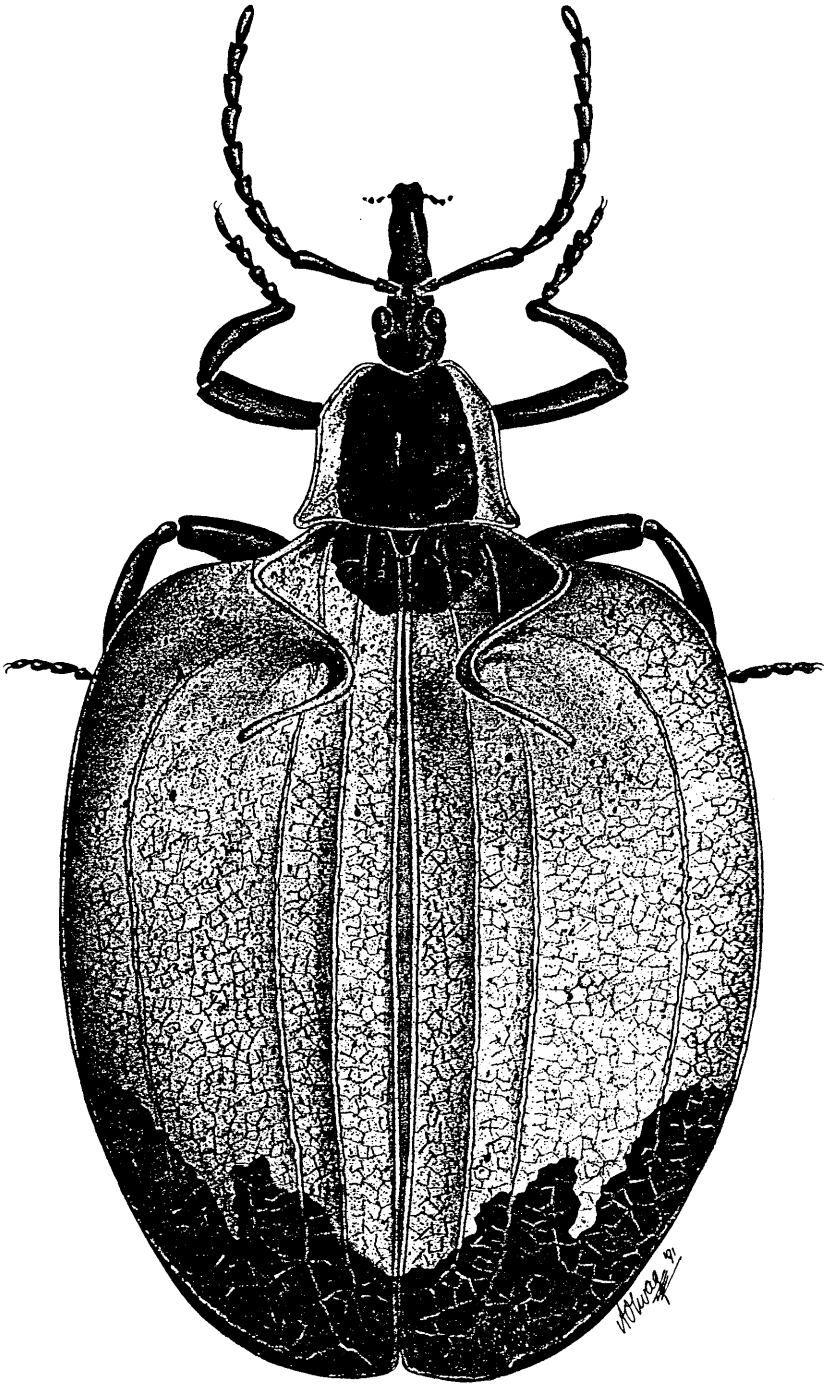


Figure 42: *Lycus (Lycus) hamatus* Guérin-Méneville.

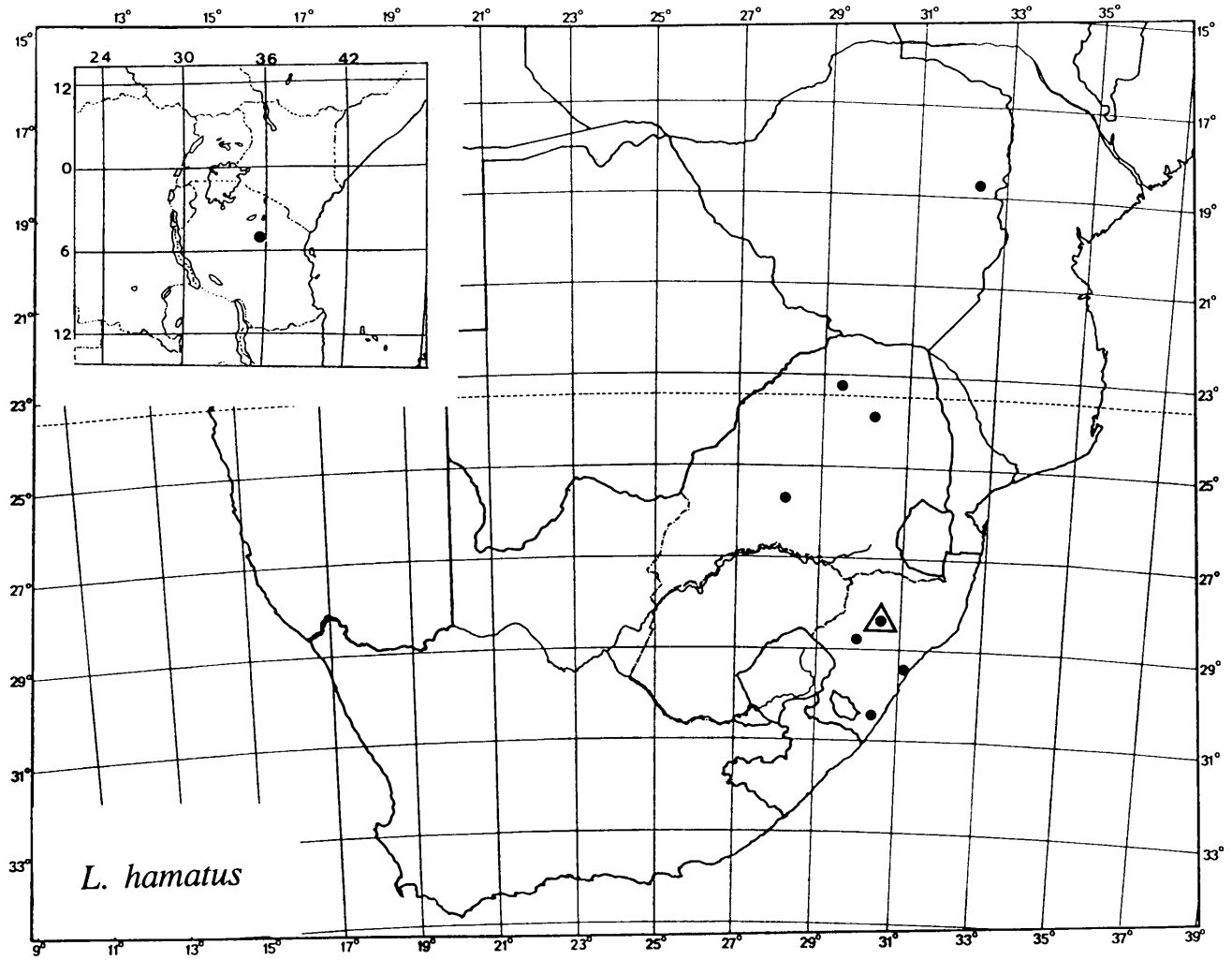


Figure 43: Distribution of *L. hamatus*.

Lycus (Lycus) inornatus Bourgeois

(Figs 44, 45 & 51B)

Lycus inornatus Bourgeois, 1901: 41; 1902: 739 (v. *scapularis*); Kleine 1933: 10.

TYPE: LT (male) (new designation): South Africa "Cap de Bonne Espérance"; Verreaux 1835; 17.35 (MNHN).

Redescription

MALE

Size: length 9,0-17,0 mm; width 6,5-14,0 mm.

Head: transversely depressed between eyes, forming two pits.

Rostrum: very long and slender; 2,60-2,70X distance between eyes.

Antennae: 4-10 serrate; 3>4+5; 10<11.

Maxillary palpi: long and slender with last segment depressed apically.

Colouration: head, antennae, mesal part of pronotum, scutellar area and posterior 1/4 of elytra black; abdomen varying (mesally black, sides ochraceous - completely ochraceous); humeral crest with/without a black spot; rest of pronotum and elytra ochraceous (Fig. 44).

Pronotum: slightly broader than long (hood-shaped), 1,15-1,25X; latero-anterior angles obtuse, anterior obtusely rounded, ridged; latero-posterior angles acutely pointed; sides reflexed upwards.

Elytra: glabrous; subrounded - subsquare; humeral area roundly elevated forming a callus laterally; sutural margin straight; extremities rounded; costae 1 and 2 prominent, 3rd obsolete, 4th indistinct, with a fine network of reticulate cells between costae (Fig. 44).

Abdomen: penultimate segment transverse, posterior margin concavely arcuate; last segment very elongated and slender.

Legs: simple.

Male genitalia: extremely long and slender; median lobe slightly curved and pointed at apex; parameres very small and fused to median lobe, but visible (Fig. 51B).

FEMALE

Size: length 13,0-16,0 mm; width 6,0-7,0 mm.

Elytra elongated and subparallel, with no humeral calli; colouration and shape of pronotum similar to male.

Discussion

This species is very similar to *L. hamatus* Guérin-Méneville, differs in the absence of the long humeral spine, but has a raised humeral callus in the same position. The shape and colouration of the pronotum and the aedeagus are similar. These two species seem to be closely related, with the same distribution range, but the posterior black colouration differs (and differs by humeral spines (*hamatus*) and calli (*inornatus*).

Material examined

18 specimens examined.

SOUTH AFRICA: CP. Green Valley, Wilderness (I BMNH); TVL. Johannesburg (4 SANC; 3 TMSA); Lydenburg (1 TMSA); Rustenburg Nat. Res. (5 SANC); Vaalwater (1 UPSA); Ross? (1 SAMC). ZIMBABWE: Bulawayo (1 TMSA).

Geographical distribution (Fig. 45)

Zimbabwe, South Africa (Cape, Natal and Tvl).

Diagnosis

Easily distinguished by the ovally-rounded elytra with associated humeral calli and long and slender aedeagus.

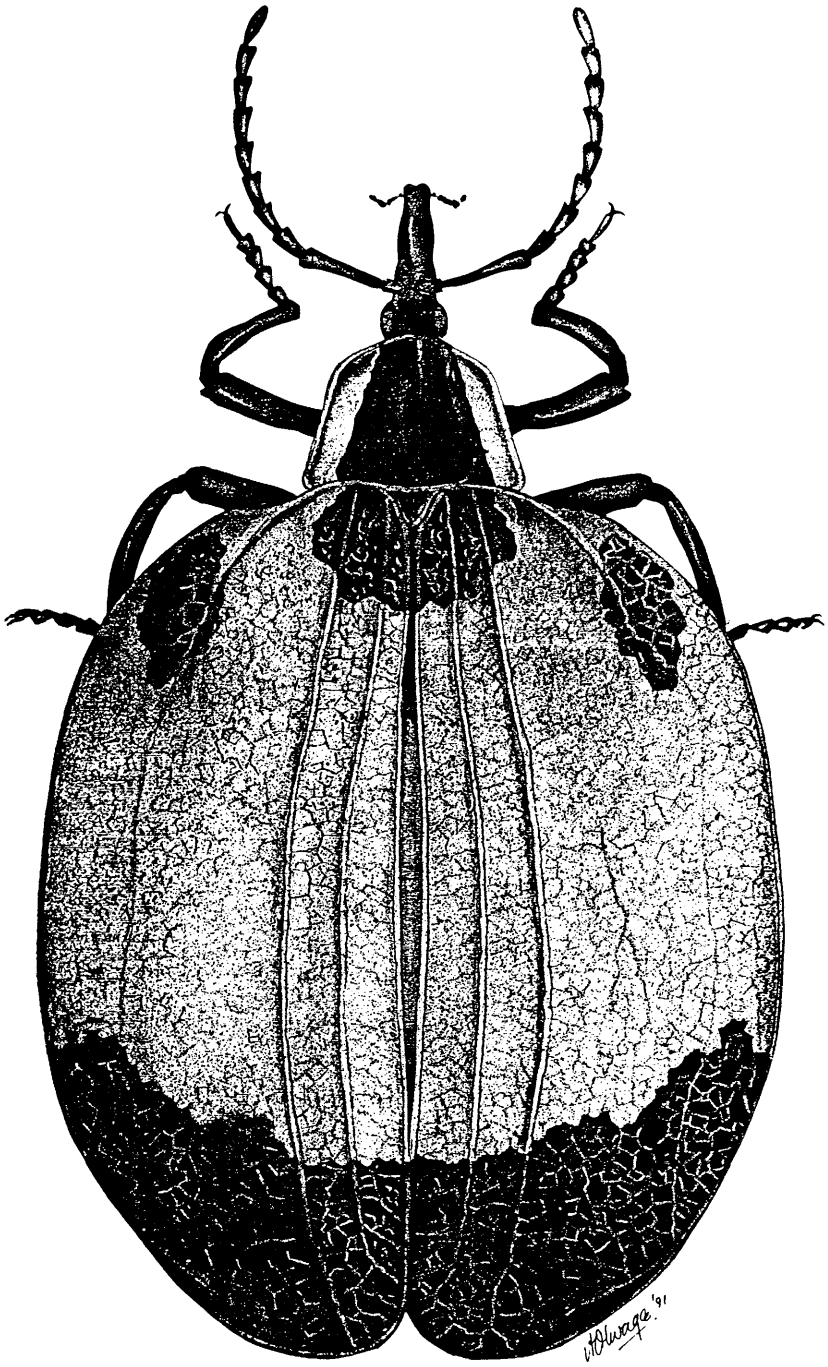


Figure 44: *Lycus (Lycus) inornatus* Bourgeois.

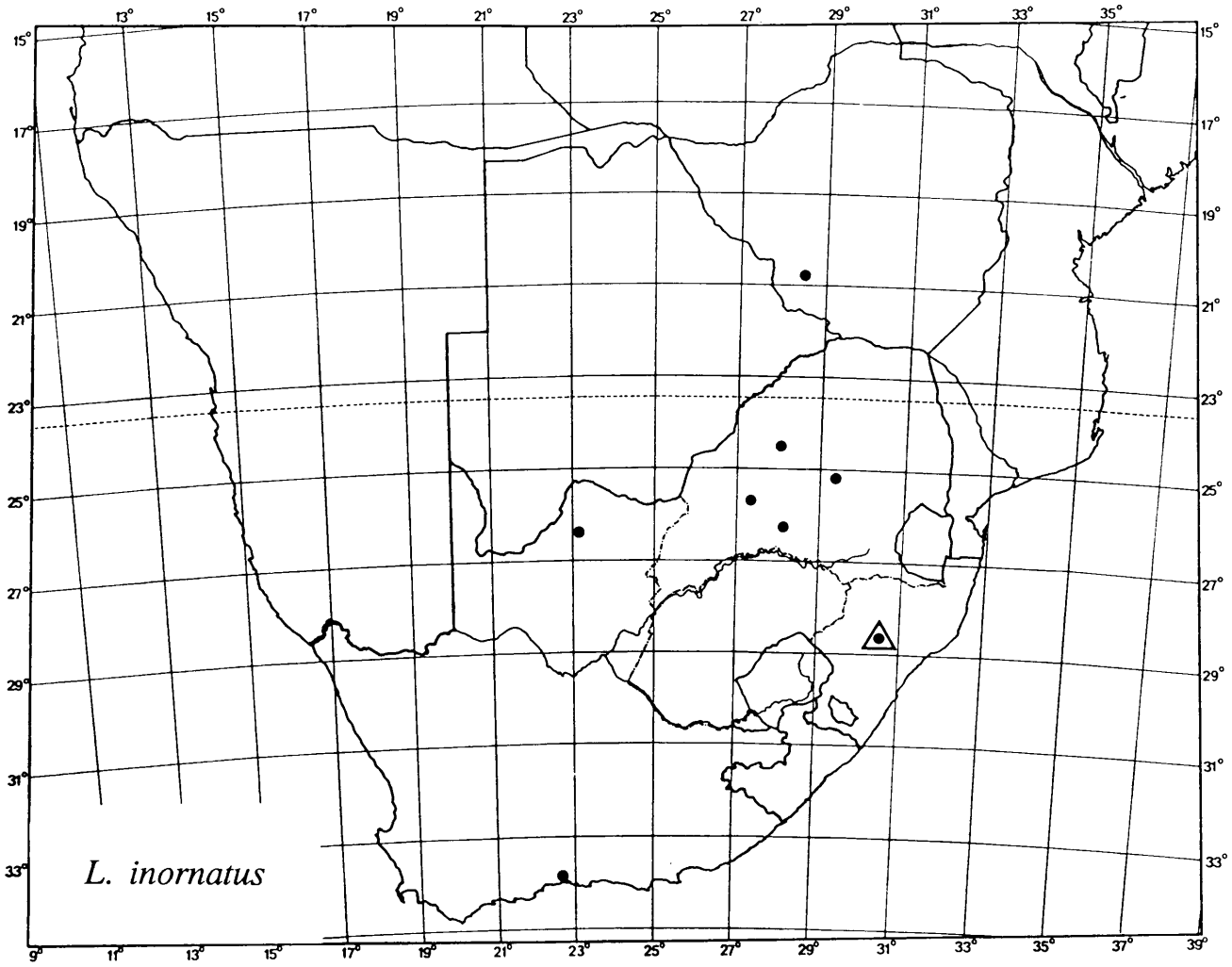


Figure 45: Distribution of *L. inornatus*.

Lycus (Lycus) kolbei Bourgeois

(Figs 46, 47 & 51C)

Lycus kolbei Bourgeois, 1889a: 226; 1900: 143; Kleine 1933: 10.

TYPE: HT (male): South Africa, Transvaal Botschabelo; Niemeyer Type 65525 (ZMHB).

Redescription

MALE.

Size: length 14,0-23,5 mm; hum. width 8,0-15,0 mm; width 10,5-17,5 mm

Rostrum: length 1,80-2,10X distance between eyes.

Head: transversely depressed between eyes above antennae insertions, forming two pits.

Antennae: 5-10 serrate; 3<4+5; 10<11.

Maxillary palpi: slender with last segment elongately depressed apically.

Colouration: head, antennae, mesal part of pronotum, legs (varying degree), scutellar area and posterior 1/4 of elytra black; black of posterior part of elytra may/may not extend along mesal part of sutural margin meeting two sutural spines; humeral area may/may not have a black spot laterally; abdomen (speckled black), varying to completely ochraceous; rest of pronotum and elytra ochraceous (Fig. 46).

Pronotum: transverse, 1:1,48-1,60; anterior angles obtuse, with anterior ridged centrally; posterior angles acutely rounded; sides slightly reflexed.

Elytra: glabrous; subrounded-subsquare; humeral area with medio-lateral depression, humeral sides marginated and slightly elevated; sutural margin straight anteriorly, elevated extending into two, long, slender "sutural" spines originating on costa 1 (more or less 1/3 way down); sutural margin posteriorly slightly convex (overlapping) at rounded extremities; 4 visible costae, costae 1 and 2 prominent (costa 1 indistinct posterior to sutural spine), with irregular reticulate cells between costae (Fig. 46).

Abdomen: penultimate segment transverse; last segment triangular.

Legs: simple

Male genitalia: with median lobe short and stout, produced into a hook pointing ventrally; parameres closely fused but distinct (Fig. 51C).

FEMALE:

Size: length 16,5-20,0 mm; hum. width 5,0-6,5 mm; width 8,0-10,0 mm.

Elytra suboval, posterior 2/3 slightly dilated; colouration and form of pronotum and elytra similar to male.

Discussion

Bourgeois (1889a), claimed that this species is very similar to *hamatus* Guérin-Méneville, except that the spines are situated on the sutural margins and not on the elevated humeral crests. However, the form of the pronotum, aedeagus and elytra as well as the colouration differ completely.

The hooked aedeagus is very similar to that of *L. alatus* Kleine. The distribution range differs, with *alatus* being a very rare species, occurring in Zimbabwe only.

This species also seems to be very similar to *L. kerandeli* Guérin-Méneville described from the Zaire (Congo). This may be a synonym or very similar species, but I have only seen illustrations and have not examined any material, therefore no conclusions can be made.

Material examined:

63 specimens examined.

SOUTH AFRICA: TVL. (5 ISNB; 3 MNHN); Agatha (5 UPSA); Barbeton (2 SANC, 1 TMSA, 2 SAMC); Blouberg-Motlakeng (1 TMSA); Krugersdorp (1 TMSA); Lake Fundezi (1 TMSA); Lydenburg (1 TMSA); Machadodorp (1 SANC); Naboomspruit (14 SANC); Nelspruit (1 UPSA); Pietersburg (1 UPSA); Potchefstroom (1 SANC); Pretoria (1 UPSA, 5 SANC); Pretoria North (2 UPSA); Rustenburg Nat. Res. (1 SANC); Saartjiesnek (8 UPSA); Swartruggens-Marico (3 TMSA); Waterval (2 SANC).

Geographical distribution (Fig. 47)

South Africa (Tvl).

Diagnosis

This species is easily distinguished by the sutural spines, depressed humeral area, as well as the form of the aedeagus and distribution range apparently limited to the Transvaal.

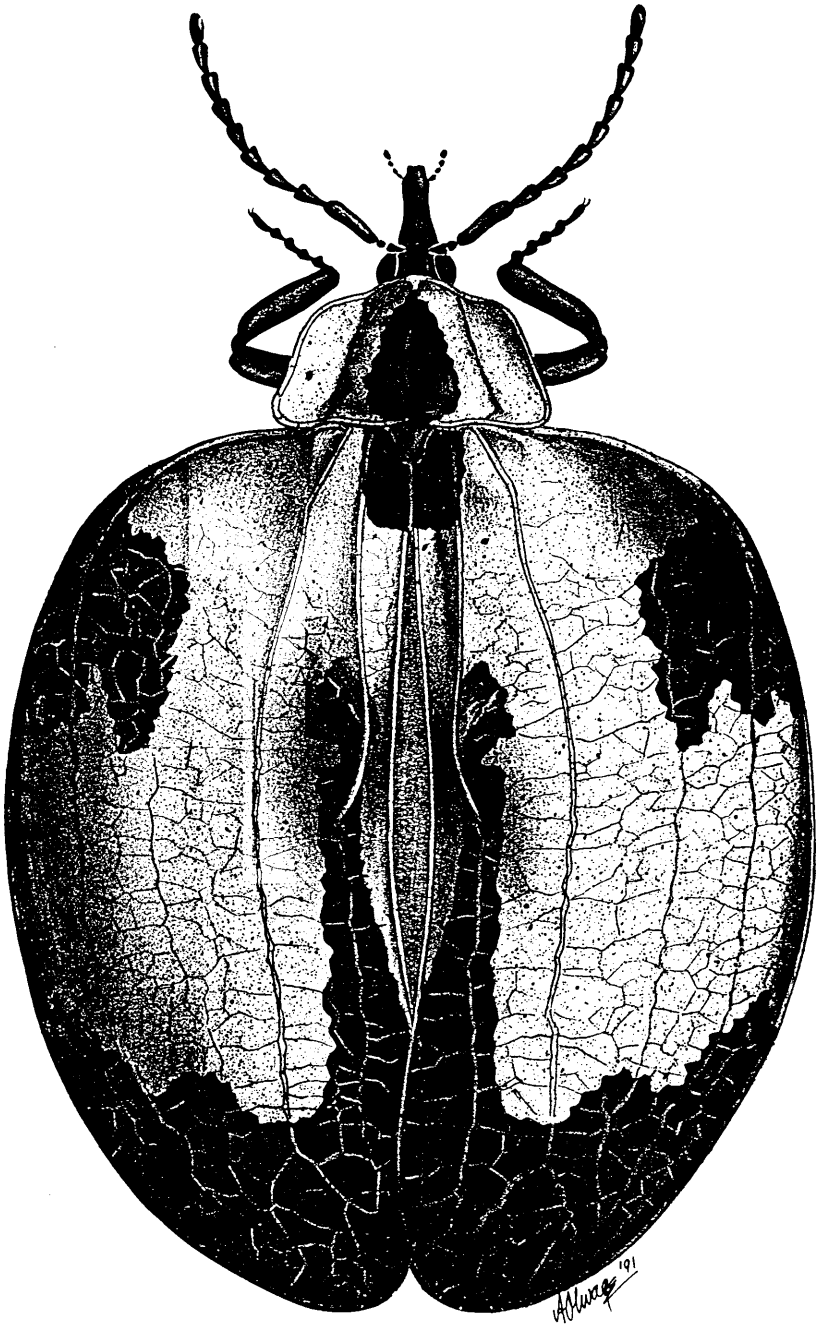


Figure 46: *Lycus (Lycus) kolbei* Bourgeois.

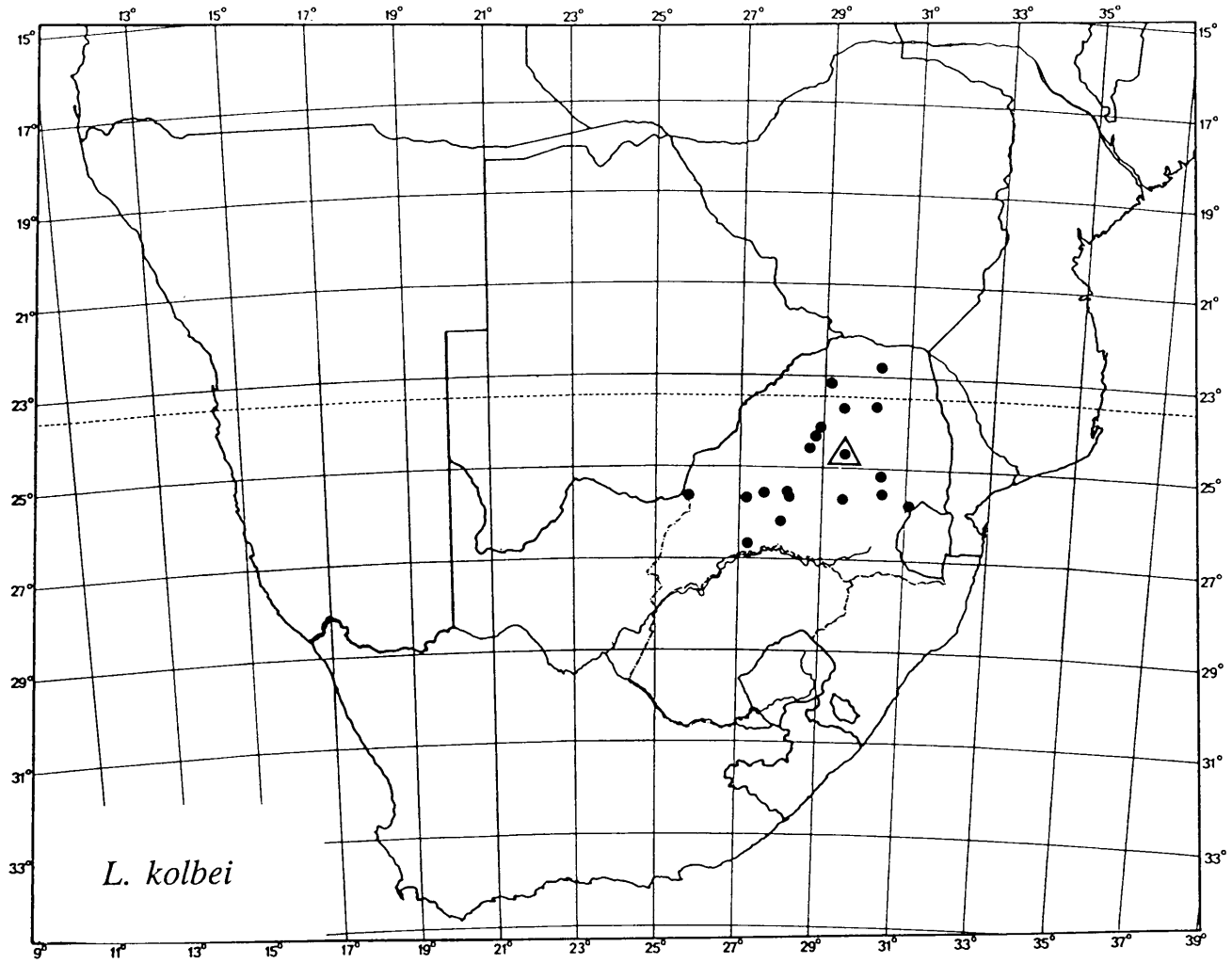


Figure 47: Distribution of *L. kolbei*.

Lycus (Lycus) palliatus (F.)

(Figs 48, 49 & 51D)

Pyrochroa palliatus F., 1775: 203.

Lycus palliatus: F. 1787: 163; Roemer 1789: 47; Oliver 1790: 5; Fabricius 1801: 110; Waterhouse 1879: 17; Kleine 1933: 10; Gomes-Alves 1967: 49.

reticulatus Wulfen, 1786: 20.

pallulatus Dalman, 1817: 27o.

TYPES: No *palliatus* and *reticulatus* types could be traced.

L. pallulatus: 1 HT (female); 2PT (females): "Cap bon sp; 162/189; 163/89; 164/89 (NHRS).

Redescription

MALE

Size: length 9,5-17,0 mm; width 7,0-12,0 mm.

Head: moderately depressed between eyes, forming two pits.

Rostrum: long and slender; 2,40-2,95X distance between eyes.

Antennae: 5-10 serrate; 3<4+5; 10<11.

Maxillary palpi: long and slender, last segment slender, elongated, slightly depressed apically.

Colouration: head, antennae, scutellum, pronotum (horizontal black band extending meso-anteriorly), abdomen, legs, 1/3 of elytra (dentate margin) black; rest of abdomen, pronotum and elytra ochraceous (Fig. 48)

Pronotum: transverse, 1:1,55-1:1,65; latero-anterior angles obtuse, with anterior angle ridged, slightly protruding; posterior angles acutely rounded, slightly extended, sides reflexed.

Elytra: glabrous; sides dilated, subrounded-subsquare form; sutural margin bloatated mesally, posteriorly sutural margin slightly parted; extremities subsquare-rounded, slightly depressed, extended laterally; 4 visible costae, 4th costa extending along lateral margin; a network of irregular reticulate cells between costae (2 or more rows) (Fig. 48).

Abdomen: penultimate segment transverse, sides posteriorly slightly extended, posterior margin straight; last segment triangular.

Legs: simple.

Male genitalia: small and short; median lobe, furcately curved and pointed perpendicularly downwards at apex; parameres large, stout and clearly visible (Fig. 51D).

FEMALE

Size: length 8,0-14,0 mm; width 4,5-8,0 mm.

Elytra subparallel, colouration similar to male. Distinguished by the black, banded pronotum.

Discussion

This is a very stable species, both in elytral form and colouration, especially the black-banded pronotum. *L. palliatus* has a southern African coastal distribution range (the two localities from the OFS and Transvaal not verified).

A similarity exists with *L. ampliatus* Fåhraeus, but differs in: (a) bloatated form of the elytral sutural margin, more pronounced, (b) the subsquare, slightly depressed extremities extending laterally , (c) the constant black colouration of the elytra and especially the pronotum (black-banded) and (d) the form of the aedeagus (pointed perpendicularly downwards).

Material examined

274 specimens examined.

SOUTH AFRICA. (6 ISNB); "Afrique" (1 MNHN); CP. (4 ISNB; 1 MNHN); Arniston (1 TMSA); Cape Town (4 SAMC; 4 SANC; 2 TMSA); Duinefontein (1 SAMC); George (5 SAMC; 29 TMSA); Grahamstown (1 TMSA); Harkerville For. Res. Knysna (4 TMSA); Hexriver (1 SANC); Houtbay (2 SAMC); Isipingo (1 SANC); Jonkersberg (2 TMSA); Keurboomstrand (18 TMSA); Knysna (2 SAMC; 36 TMSA); Port Elizabeth "Algoa Bay" (3 SAMC; 41 TMSA); Riversdale (1 ISNB); Sir Lowry's Pass (1 SANC); Somerset (1 SAMC); Strandfontein (67 SAMC); Uitenhage (14 SAMC); Wynberg (2 SANC); Zoetendals (1 TMSA); NAT. Durban (3 SAMC); Empangeni (1 TMSA); OFS. Bloemfontein (1 SANC); TVL. Blouberg (1 TMSA).

No locality (8 SAMC; 1 SANC).

Geographical distribution (Fig. 49)

South Africa (Cape, and Natal). (OFS and Tvl not verified).

Diagnosis

Easily distinguished by the black-banded pronotum as well as the form of the aedeagus.

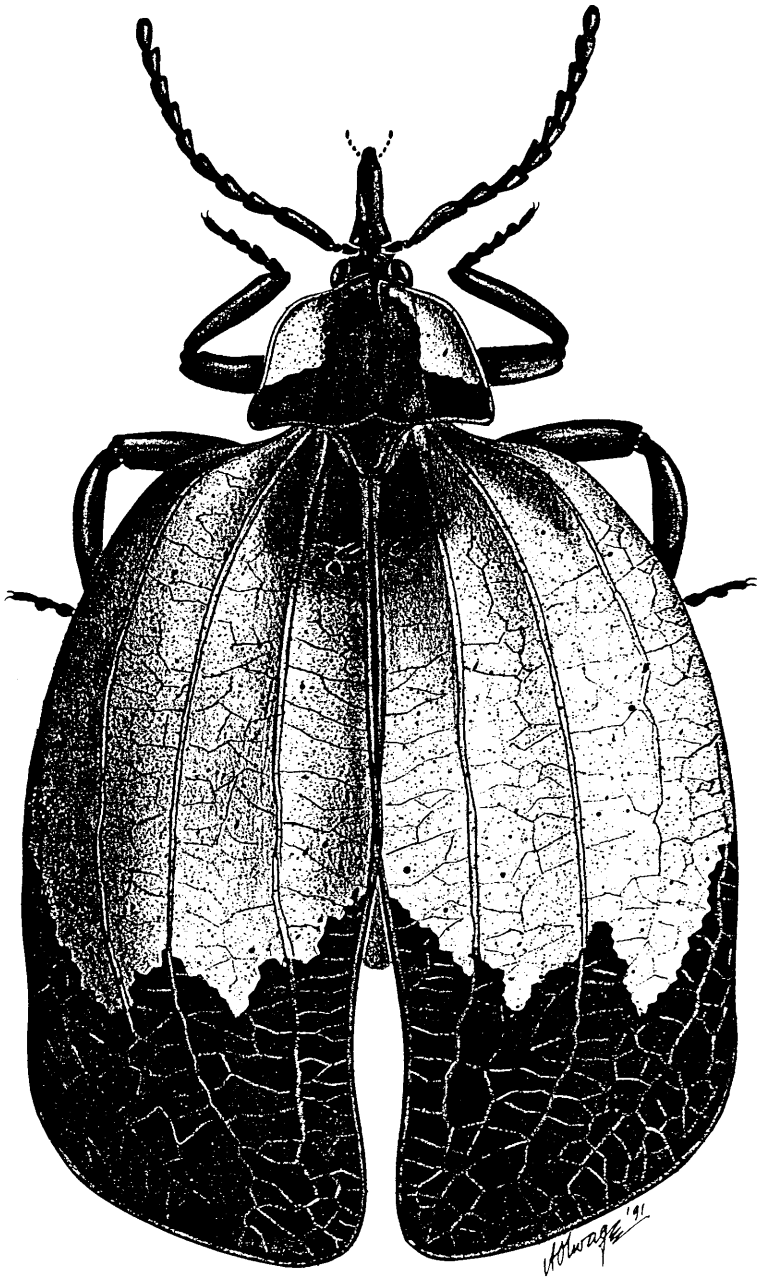


Figure 48: *Lycus (Lycus) palliatus* Fabricius.

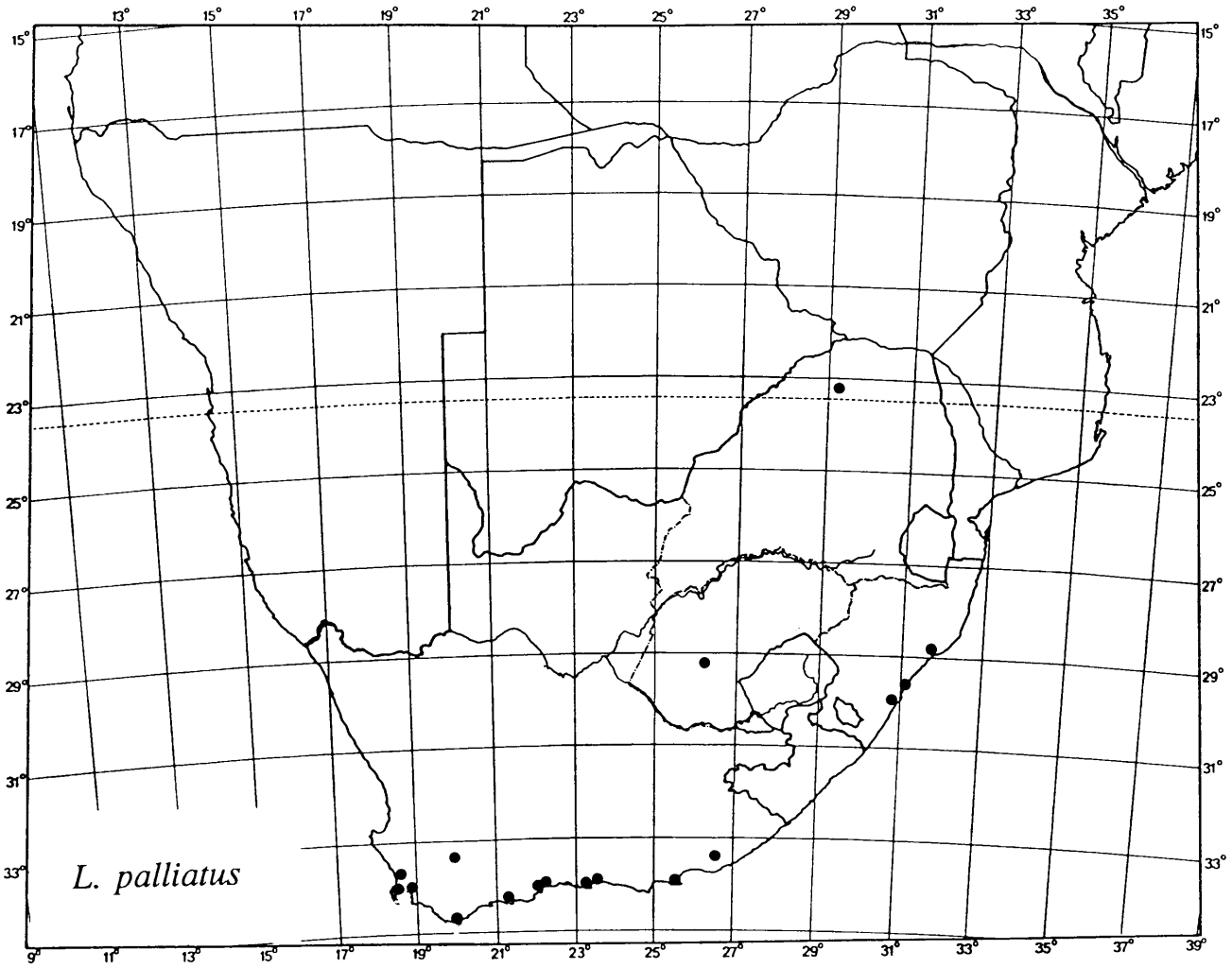
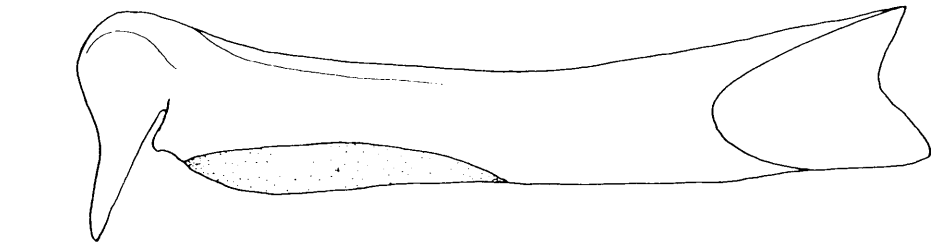
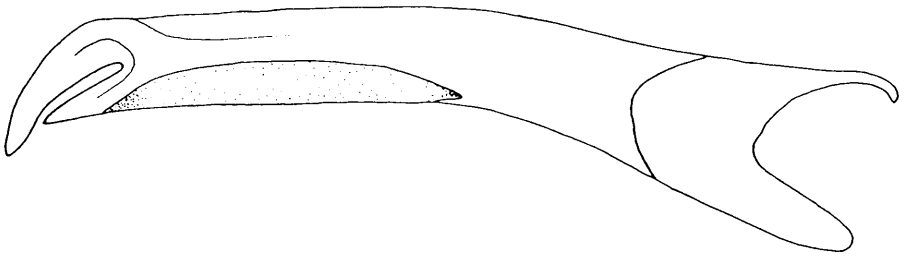


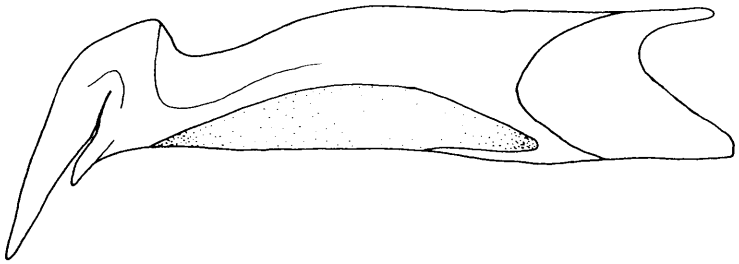
Figure 49: Distribution of *Lycus palliatus*.



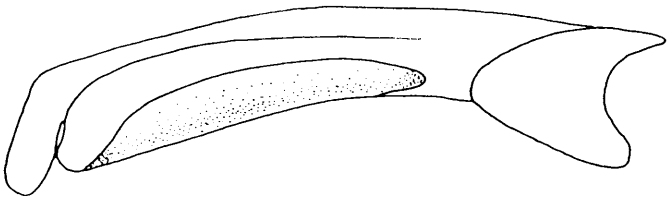
A



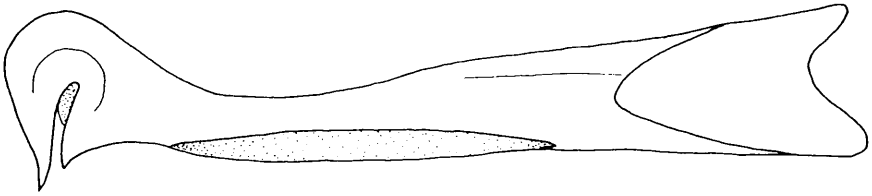
B



C

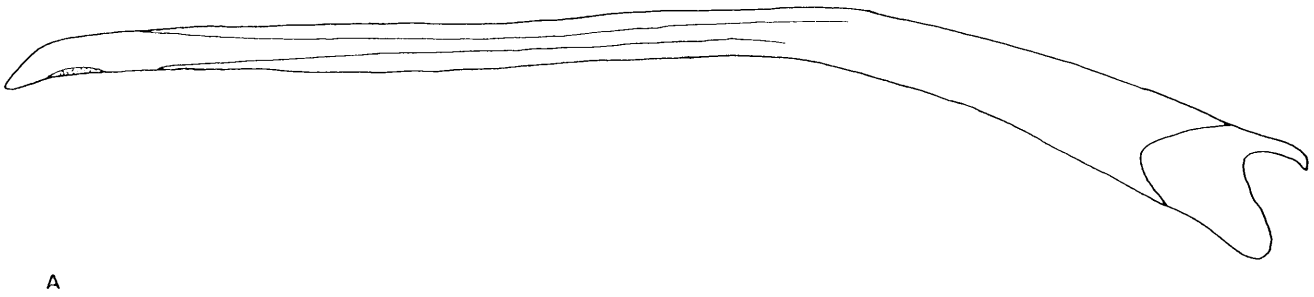


D

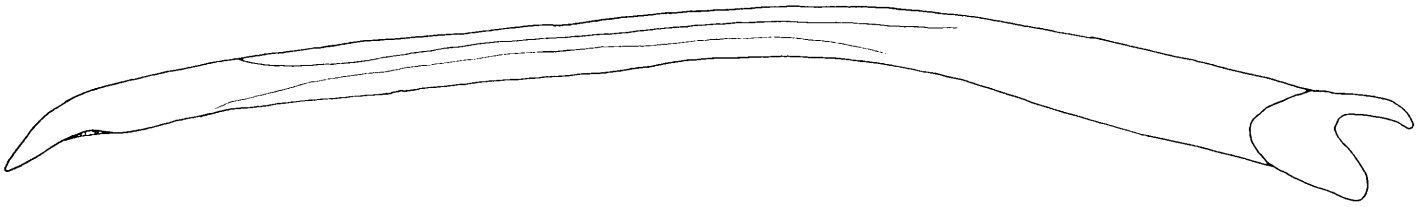


E

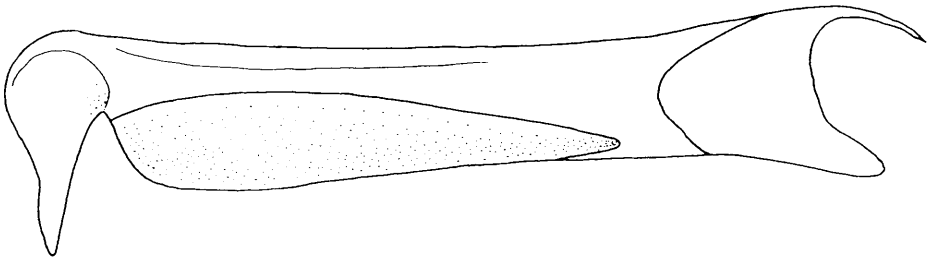
Figure 50A - E: Male genitalia: - **A** *L. alatus*. - **B** *L. ampliatus*. - **C** *L. duvivieri*. - **D** *L. elevatus*. - **E** *L. foliaceus*.



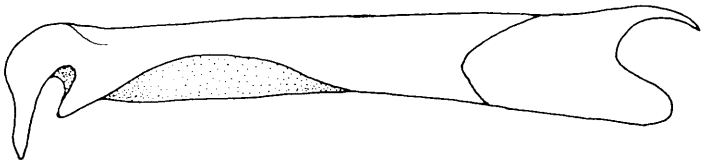
A



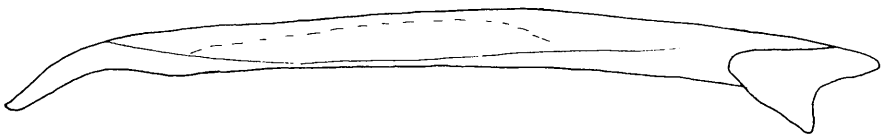
B



C



D



E

Figure 51A - D: Male genitalia: - **A** *L. hamatus*. - **B** *L. inornatus*. - **C** *L. kolbei*. - **D** *L. palliatus*.

5.5.5 Species of the subgenus *Chlamydolycus*.

Lycus (Chlamydolycus) distanti Bourgeois

(Figs 52, 53 & 61A)

Lycus distanti Bourgeois, 1892: 196; 1902: 739; Kleine 1933: 11; Gomes-Alves 1967: 50.

TYPE: No types traced.

Redescription

MALE

Size: length 10,0-17,0 mm; width (hum. width) 7,0-14,0 mm.

Head: slightly depressed between eyes, forming two pits.

Rostrum: slightly broadly elongated; 1,55-1,70X distance between eyes.

Antennae: 5-10 serrate, compressed; 3<4+5; 10<11 (11 stout).

Maxillary palpi: slender, last segment depressed apically.

Colouration: head, antennae, legs (varying- coxa and part of femur ochraceous), abdomen (varying from black to ochraceous), pronotum (varying from black mesally to completely ochraceous), scutellar area, posterior 1/3 of elytra, below lateral dilations black (dentate margin); rest of pronotum and elytra ochraceous (Fig. 52).

Pronotum: broader than long, 1:1,40-1,50; anterior angulation obtuse (rounded form anteriorly), anterior protrusion slightly ridged; posterior angles acutely rounded; sides reflexed.

Elytra: glabrous; subcordate; humeral area dilated laterally forming so-called "wings", depressed meso-laterally; lateral margins reflexed upwards and inwards; posterior half elongately subparallel, with extremities ovally-rounded, slightly pointed; 4 visible costae, costae 1 and 2 prominently elevated, 3rd and 4th indistinct; a fine, irregular network of small reticulate cells between costae; sutural margin straight in scutellar area, but slightly dilated meso-posteriorly, overlapping (Fig. 52).

Abdomen: penultimate segment transverse, posterior margin arcuate; last segment triangularly elongated.

Legs: simple.

Male genitalia: simple; parameres slender, closely fused to median lobe; median lobe long and slender, slightly curved and pointed apically (Fig. 61A).

FEMALE

Size: length 12,0-17,0 mm; width 6,5-9,0 mm.

Elytra long and slender, with slight lateral dilations; black markings similar to male.

Discussion

Elytra very similar in form to *L. elevatus* Guérin-Méneville and *L. poultoni* Bourgeois, but the humeral dilations ("wings") in *distanti* are more pronounced, depressed medio-laterally, and the extremities more pointed. The form of the aedeagus is completely different, but very similar to *L. hamatus* Guérin-Méneville and *inornatus* Bourgeois, differing in that the parameres are larger and median lobe not as long and curved apically.

Material examined

80 specimens examined.

SOUTH AFRICA: CP. DelaRey (1 TMSA); Willowmore (1 TMSA); NAT. Allerton (2 SANC, 3 TMSA); Durban (2 SAMC, 4 SANC); Hillcrest (1 TMSA); Kwa Zulu, 35km N Jozini Ndumu Road (2 SANC); Malvern (5 SAMC, 5 SANC, 2 TMSA); Mtunzini (1 UPSA); Natal, Upper distr. (1 SAMC); Ndumu Res. (1 UPSA); Pinetown (1 SANC, 3 TMSA); TVL. Agatha (4 UPSA); Blouberg (1 TMSA); Hazyview (1 UPSA); Johannesburg (2 SAMC, 1 SANC); Lydenburg (1 TMSA); Lydenburg distr., De Kuilen (1 SANC); Naboomspruit distr. (2 SANC); Nylstroom (1 TMSA); Pelindaba (1 UPSA); Pienaars Riv. Dam (1 SANC); Pretoria (4 TMSA, 1 UPSA); Pretoria North (2 UPSA); Pretoria, 25km N. (2 SANC); Saartjiesnek (16 UPSA); Three Sisters (1 TMSA); Waterberg (1 TMSA); Witpoortjie (1 TMSA); Zebediela, Mogoto Nat. Res. (1 SANC).

Geographical distribution (Fig. 53)

South Africa (Cape, Natal and Tvl).

Diagnosis

Easily recognized by the lateral "winged" and depressed dilations, the distinct black elytral markings, and the form of the aedeagus.

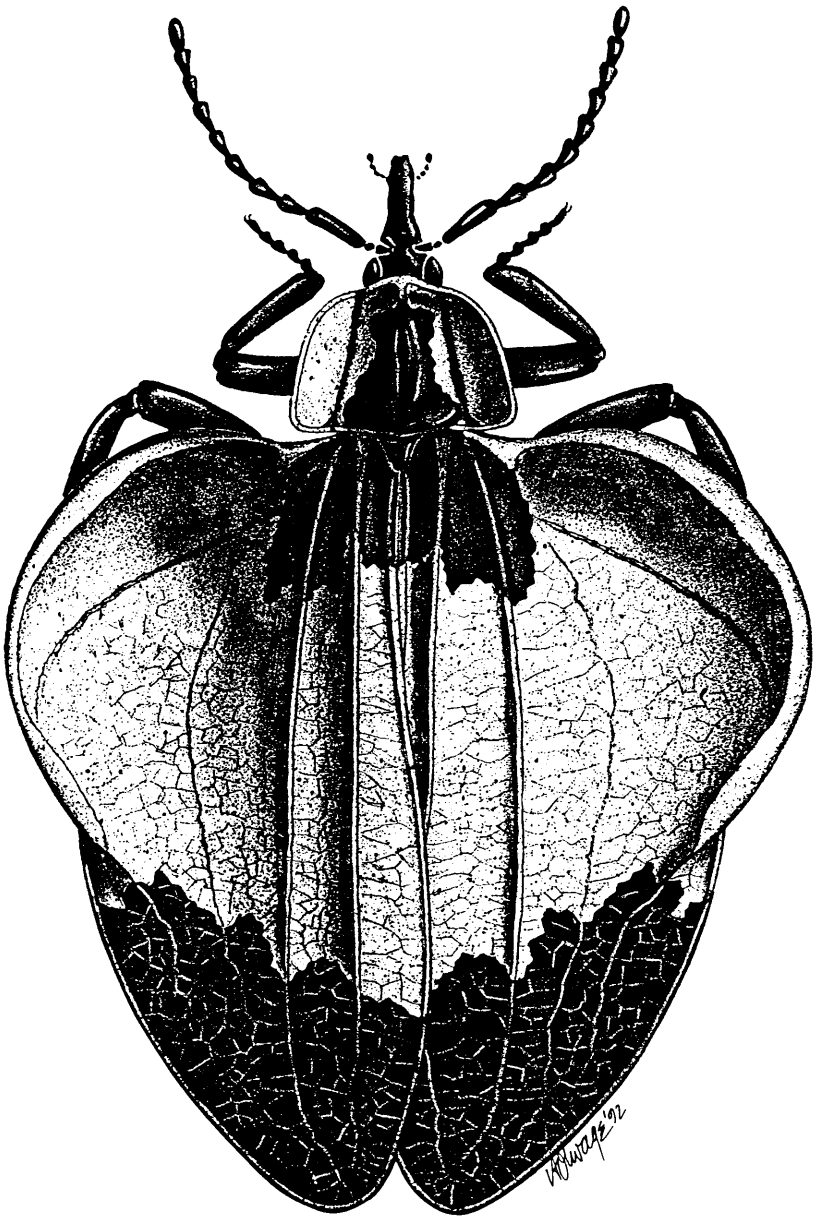


Figure 52: *Lycus (Chlamydolycus) distanti* Bourgeois.

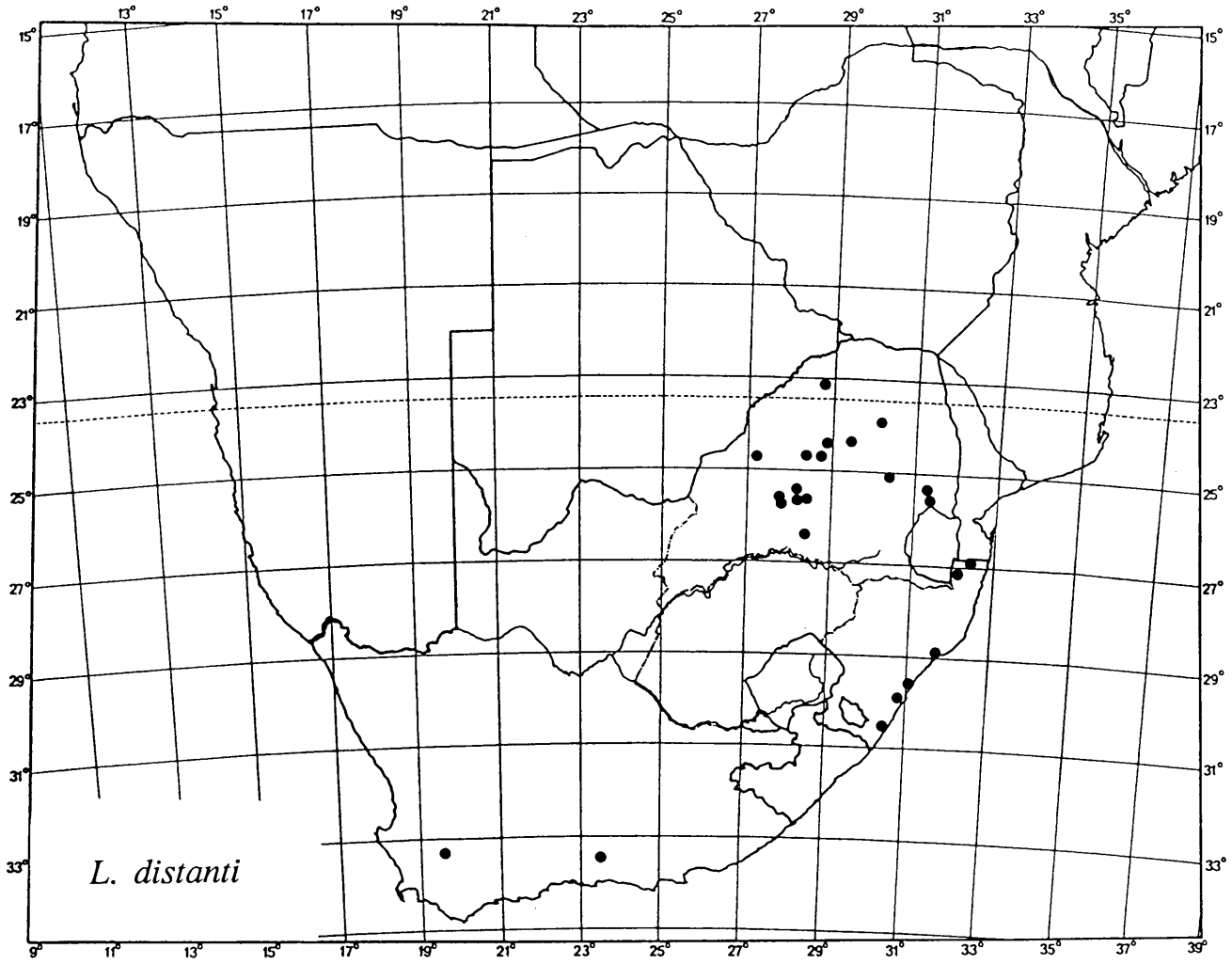


Figure 53: Distribution of the *L. distanti*.

Lycus (Chlamydolycus) poultoni Bourgeois

(Figs 54, 55 & 61B)

Lycus poultoni Bourgeois, 1902: 739; Kleine 1933: 11.

TYPE: No types traced.

Redescription

MALE.

Size length 13,0-21,0 mm; width 10,0-19,0 mm.

Head: very deeply depressed between eyes forming two deep pits.

Rostrum: long, 2,0-2,1X distance between eyes.

Antennae: 5-10 serrate; 3<4+5; 10 11.

Maxillary palpi: long and slender; last segment elongated and depressed apically.

Colouration: antennae, head, legs, scutellar area (may/may not extend posteriorly), mesal part of abdomen and pronotum; posterior 1/3 (below dilated anterior part of elytra) black; a rounded black mark is situated on antero-lateral, dilated part of elytra; rest of elytra and sides of pronotum and abdomen ochraceous (Fig. 54).

Pronotum: transverse, 1,65-1,70X; anterior angles obtusely rounded, apical angle slightly protruding (anterior straight-rounded in form); posterior angles acutely rounded; sides slightly reflexed laterally.

Elytra: glabrous; anterior sides elongately dilated, with margins slightly reflexed upwards and inwards; posterior sides elongately subparallel; extremities rounded, slightly distant at apex; sutural margin straight; costae 1 and 2 prominent, 3 obsolete and 4 indistinct (extending parallel with lateral dilated margin; a fine network of small reticulate cells between costae (Fig. 54).

Abdomen: penultimate segment transverse, posterior margin sinuately arched; last segment triangular.

Legs: simple.

Male genitalia: short and stout; parameres short, broad, closely fused to median lobe, but distinct; median lobe hooked and broadly curved apically (Fig. 61B).

FEMALE

Size: length 17,0 mm; width 12,0 mm (Bourgeois 1902).

Not seen.

Discussion

A very rare species from the coastal regions of southern Africa, but easily distinguishable. As previously discussed, the elytral form is very similar to *L. elevatus* Guérin-Méneville and *L. distanti* Bourgeois. The aedeagus is also very similar to *L. elevatus* (see previous discussion). The elytral form and colouration seem to be very constant.

Material examined

10 specimens examined.

SOUTH AFRICA: CP. "Cap. de Bonne Esp. (with det. label Bourgeois 1900 *elevatus*) (1 ISNB); East London (1 TMSA); Hogsback (1 TMSA); NAT. Durban (1 SANC); Umzimkulu (1 SANC); No locality (3 SANC, 2 SAMC).

Geographical distribution (Fig. 55)

South Africa (Natal and Cape).

Diagnosis

This species can easily be distinguished by the dilated anterior humeral area of the elytra and associated black markings as well as the form of the aedeagus.

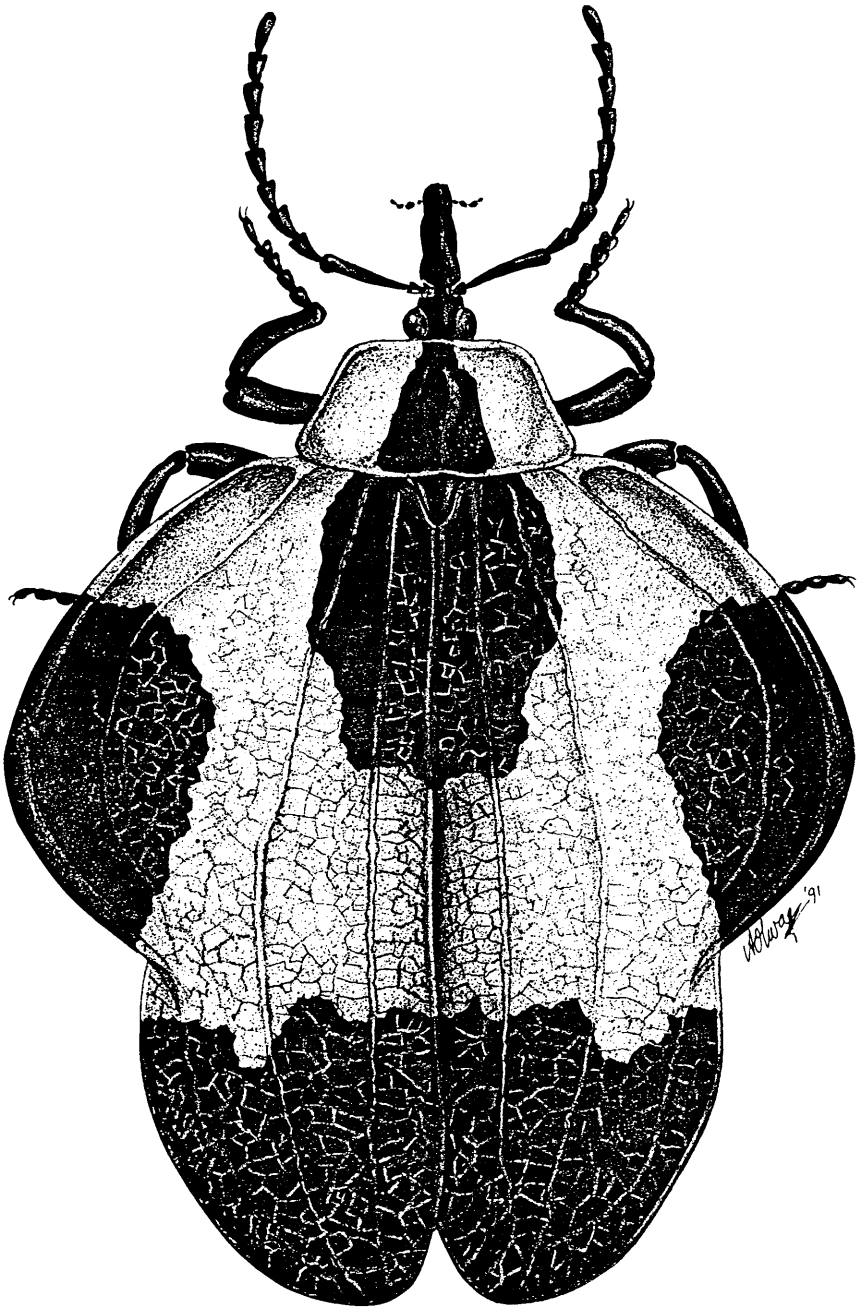


Figure 54: *Lycus (Chlamydolycus) poultoni* Bourgeois.

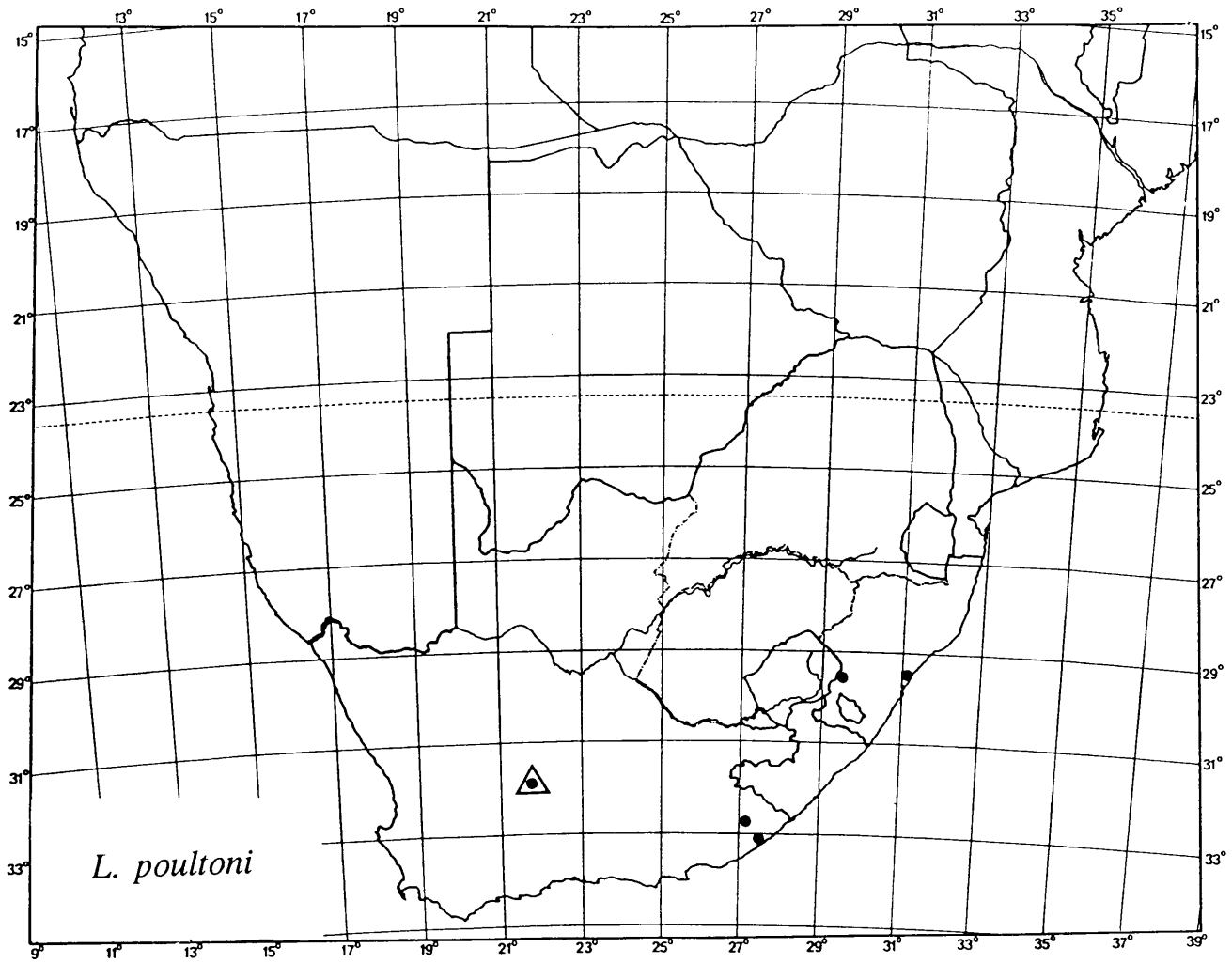


Figure 55: Distribution of *L. poultoni*.

Lycus (Chlamydolycus) subtrabeatus Bourgeois

(Figs 56, 57 & 61C)

Lycus subtrabeatus Bourgeois, 1880b: 5; 1901: 43; Kleine 1933: 11; Gomes-Alves 1959: 111; 1967:50; 1978:18.

TYPE: No type specimen traced.

Redescription

MALE

Size: length 13,0-20,5 mm; width 5,0-11,5 mm.

Head: transversely depressed between eyes forming two deep pits.

Rostrum: long and broad; 1,65-1,90X distance between eyes.

Antennae: 4-10 serrate; 3<4+5; 10<11 (11 broad).

Maxillary palpi: long and stout, with last segment depressed apically.

Colouration: head, antennae, mesal part of pronotum, abdomen, legs (varying), scutellar area (varying) and posterior 1/4 of elytra black (margin straight); sides of elytra with/without black mark; rest of abdomen, pronotum and elytra ochraceous (Fig. 56).

Pronotum: transverse, 1:1,25-1,45; latero-anterior angles obtuse, with anterior angle ridged, obtusely protruding; latero-posterior angles more or less right angled; sides reflexed.

Elytra: elongated; slightly dilated, inflated epipleura anteriorly; posteriorly elongated; costae 1 and 2 distinct, 3rd indistinct and 4th visible extending along lateral margin; 1 row of reticulate cells between costae; sutural margin straight; extremities ovally rounded (Fig. 56).

Abdomen: penultimate segment transverse, posterior margin deeply arched; last segment slightly triangularly elongated.

Legs: simple

Male genitalia: median lobe long, broad and rounded, split laterally at apex; parameres short, broad and distinct (Fig. 61C).

FEMALE

Size: length 13,0-18,0 mm; width 5,0-7,0 mm.

The elytra of female more elongated in form than male, colouration similar.

Discussion

This species is very similar to *L. trabeatus* Guérin-Méneville and first glance can be mistaken for a transitional form (as can be seen by the abundant wrongly determined material found in collections), but differs in: (a) pronotum more transverse (subsquare in *trabeatus*), (b) posterior black elytral colouration with transverse margin, not "fingerprint" colouration (see discussion of *trabeatus* later), (c) form of the aedeagus different. This species has a much more stable elytral form than in *trabeatus* (with no transitional forms).

Host species: *Sacharum officinarum* (Gomes-Alves 1978).

Material examined

244 specimens examined.

AFRICA: "Afrique" (1 ISNB). BOTSWANA: (1 SANC); Metsimaclaba (1 TMSA); Morokowa (1 SANC); KENYA: Kibwezi (1 TMSA); MALAWI: Liwande Nat. Park (1 TMSA); Nkopola For. Res. (1 TMSA); SE shore L Nyasa Btwn Ft Maguire Ft Johnston (1 BMNH); S Mangochi 10 km SW (1 TMSA); SW of Lake Chilwa (1 BMNH). MOZAMBIQUE: (1 BMNH, 5 MNHN); Maputo (Nata (2 UPSA); "L.M.", Maputo (7 TMSA); Pomene (2 TMSA); Porto Amelia (1 TMSA); Zambeze caia (1 BMNH). NAMIBIA: Damara Pan (1 TMSA); Gobabis Frohs Inn on Labora (1 SMWH); Gobabis, Owing 246 (6 SMWH); Grootfontein (1 SAMC; 3 SANC); Ike 346 Outjo (1 SMWH); Kalidonia (1 SMWH); Katima Mulilo (1 UPSA); Kunene, Erikson's Drift (3 SAMC); Mangetti forest, Tsumkwe + Kungveld (1 TMSA); Nuragas (2 SAMC); Okahandja (1 SANC); Omrramba (1 SAMC); Ondongantje nr Omaruru (1 TMSA); Otjitambi fm 27mls ESE Kamanjab (1 BMNH); Otjiverongo (3 TMSA); Outjo (1 SMWH); Rietfontein 23mls SW Grootfontein (2 BMNH); Rundu (1 UPSA); Samengeigei Koaka-Kungveld (1 TMSA); Swakop R 3mls S Okahandja (1 BMNH); Tsumkwe Kungveld (1 TMSA); Windhoek (6 SMWH). SOUTH AFRICA: CP. Bordeaux (1 SAMC); Malta Ptbg (1 TMSA); Vryburg (1 SMWH); NAT. (1 ISNB; 1 MNHN; 1 SAMC); Durban "Port Natal" (1 MNHN; 1 SAMC); Kosi Bay (2 SANC); Malvern (4 SAMC); Pinetown (2 TMSA); Sarnia (1 TMSA); Sibaya Meer (1 UPSA); OFS. Bothaville (2 TMSA); Clarens (1 SANC); Golden Gate Nat. Res. (1 TMSA); Harrismith, Glen Gariff 778(1 BMSA); Harrismith, Randfontein 1184 (1 BMSA); Kerkenberg (1 SANC); Witzieshoek (1 BMNH); TVL. Agatha (2 UPSA); Blouberg (1 TMSA); Bobbejaansberg 16 km Roodeplaat dam (1 UPSA); Boekenhoutskloof (1 TMSA); Bon Accord (1 UPSA); Brits (1 UPSA); Bronkhorstspruit (2 UPSA); Doorndraaidam Nat. Res. (1 SANC); Germiston (1 UPSA); Hammanskraal (4 MNHN); Hartebeespoortdam (1 TMSA); Letaba Camp KNP (1 TMSA); Loskopdam Nat. Res. (1 SANC); Lydenburg (4 TMSA); Naboomspruit (3 SANC; 2 UPSA); Naboomspruit distr. Libertas (2 SANC); Nylsvlei Nat. Res. (1 BMNH; 1 SANC); Pienaarsrivier (1 TMSA); Pretoria (2 BMNH; 2 SANC; 5 TMSA; 2 UPSA); Rosslyn (1 SANC); Saartjiesnek (28 UPSA); Strijdom Tunnel (1 SANC); Swartkop (1 TMSA); Tshokwane 8 myl v Leeupan

(1 SANC); Vaalwater (7 UPSA); Warmbad (1 UPSA); Zeerust (1 UPSA); Zoutpan (1 TMSA). TANZANIA: Bagamoyo (1 MNHN); Tanga (1 MNHN). ZAIRE: Banana (2 ISNB); Banana (1 ISNB); Boma (1 ISNB); Boma-Banana (2 ISNB); Foret Shamuheru (1 ISNB); Kalunga (1 ISNB); Mabenga Mt. Kasale (2 ISNB); Mayumbe (2 ISNB); Ndeko, Rwindi (1 ISNB); Runda (1 ISNB); Rwindi (5 ISNB); Tshambi (4 ISNB). ZAMBIA: Namwala (3 BMNH); Zambeze, Nova Choupanga pres Chemba (9 MNHN). Zambeze, sijal (1 MNHN). ZIMBABWE: (1 MNHN); Fort Victoria (1 TMSA); Harare "Salisbury" (1 SANC); Hope Fountain (1 BMNH); Mwengwa (4 BMNH); Sawmill (3 BMNH); Sebakwe (4 SAMC); Umtali (1 SAMC); Wankie Game Res. (1 SANC).
No locality (5 SAMC, 3 SANC).

Geographical distribution (Fig. 57)

Angola, Kenya, Lesotho, Mozambique, Namibia, Senegal, South Africa (all provinces), Tanzania, Zaire, Zambia and Zimbabwe.

Diagnosis

This species is diagnosed but the elongated elytral form (with slight epipleura) and black colouration, as well as the form of the aedeagus.

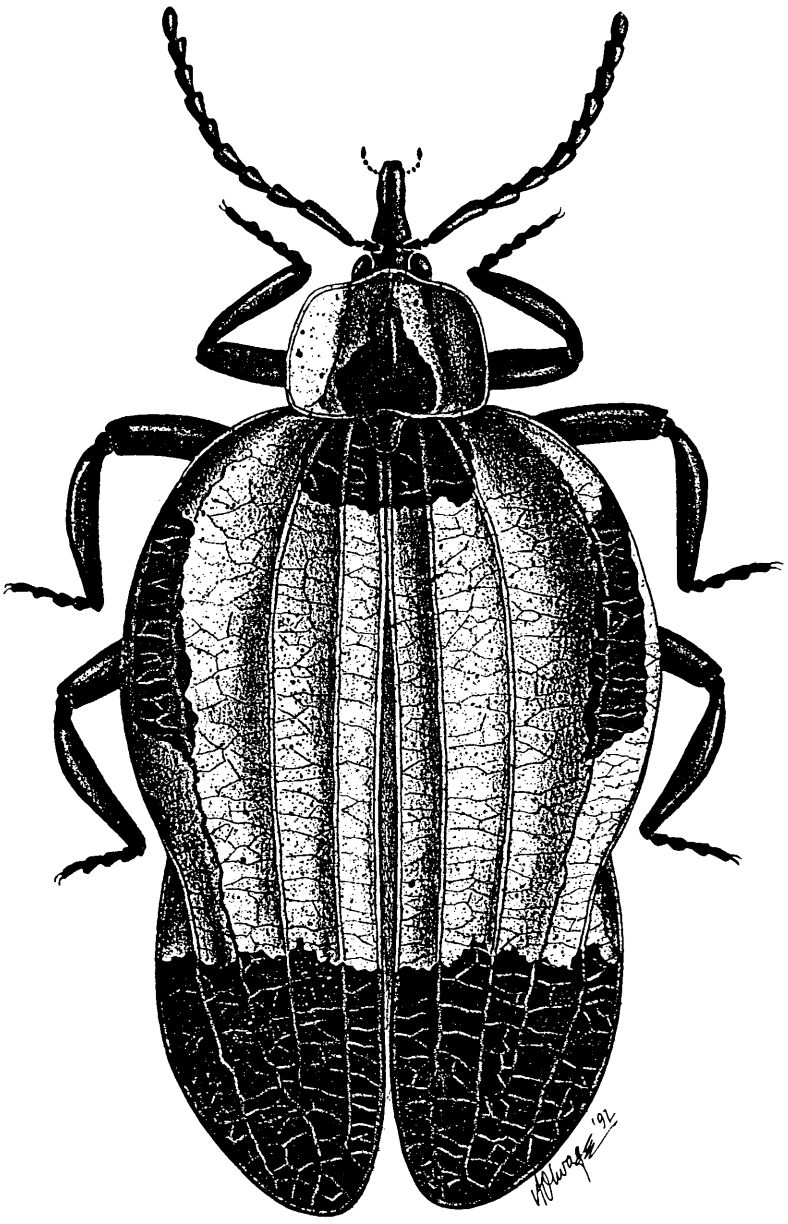
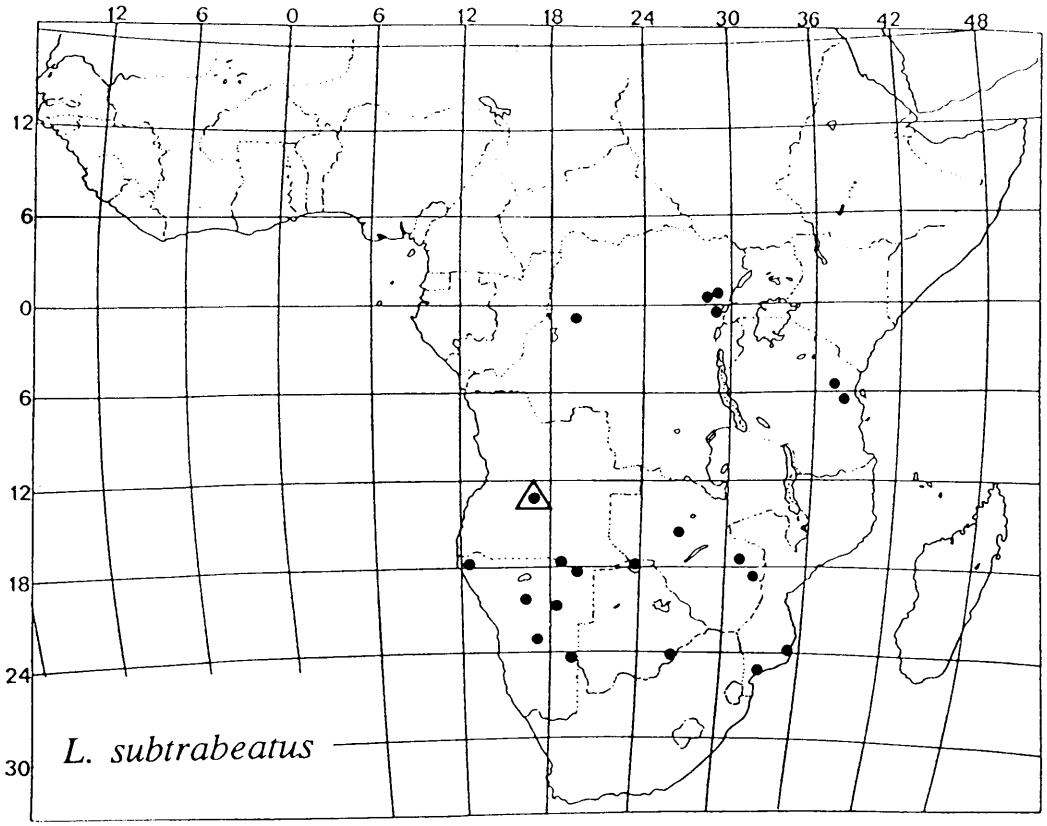


Figure 56: *Lycus (Chlamydolycus) subtrabeatus* Bourgeois.



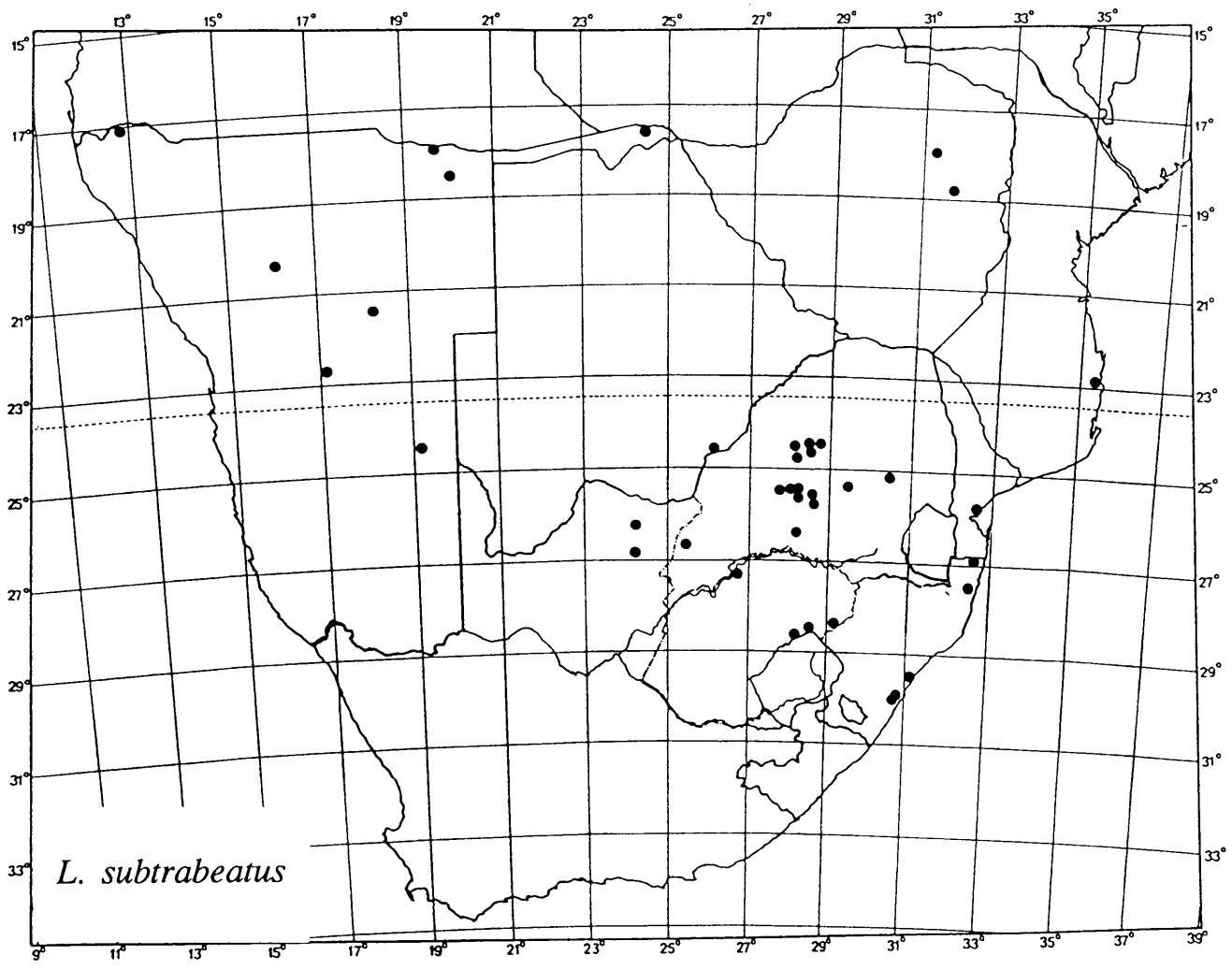


Figure 57A & B: Distribution of *L. subtrabeatus*.

Lycus (Chlamydolycus) trabeatus Guérin-Méneville

(Figs 58, 59, 60 & 61D & E)

Lycus trabeatus Guérin-Méneville, 1835: 45; Sturm 1843: 329; Guérin-Méneville 1847: 220; Fåhraeus 1851: 431; Bourgeois 1880a: 145; 1883: 629b; 1889a: 225; 1901: 42; Kleine 1933: 11; 1937: 91; Gomes-Alves 1962: 46; 1967: 50; 1978: 18.

appendiculatus Sturm, 1843: 329.

vallatus Gerstaecker, 1873: 154; Bourgeois 1889a:225.

TYPES: 1HT (male); 2PTS (males); 6 PTS (females): Sénégal; det Guérin 1835 (ISNB).

Redescription

MALE

Size: length 18,5-21,0 mm; hum. width 15,0-20,0 mm; width 8,0-13,0 mm.

Head: transversely depressed between eyes forming two deep pits.

Rostrum: long and slightly broad, 2,30-2,60X distance between eyes.

Antennae: 5-10 serrate; 3>4+5; 10<11 (11 elongated).

Maxillary palpi: long and slender, last segment elongated and apically slightly depressed.

Colouration: head, antennae (varying, 3rd segment may be ochraceous) legs (varying), mesal part of abdomen, scutellar area and posterior "tail" of elytra black (black marks shaped "fingerprint-like"); pronotum and rest of abdomen and elytra ochraceous; black marks on dilated sides varying (Figs 58 & 59).

Pronotum: subsquare, 1:0,95-1,15; latero-anterior angles obtuse, with anterior slightly ridged, protruding; posterior angles obtusely rounded (more or less right-angled); sides reflexed.

Elytra: anterior 2/3rds largely dilated, circularly-shaped; large epipleura formed ventrally, hollow and inflated; elongated posterior 1/3 extensions; extremities ovally-rounded; sutural margin straight with apex elytra slightly distant; costae 1 and 2 prominent, 3rd obsolete, 4th visible posteriorly, extending parallel with lateral margin (obsolete in humeral area); large irregular reticulate cells between costae (Fig. 58).

(2 elytral "types", and transitional forms occur - see discussion).

Abdomen: penultimate segment transverse, posterior margin deeply arched; last segment triangularly elongated.

Legs: simple

Male genitalia: median lobe long and slender, apex bi-lobed and curved; parameres small and closely associated with the median lobe (Fig. 61D & E).

FEMALE

Size: length 18,5-20,0 mm; hum. width 15,0-19,0 mm; width 6,0-7,0 mm.

Elytra elongately shaped, with colouration similar to the male (form may also be similar - see discussion).

Discussion

According to kleine (1937) a very variable species, not only in colour, but also in form.

The shape of the elytra is very variable in this species (see Figs 58 & 59). Two types of elytra exist (a) those with the elytra greatly dilated and (b) those with the elytra long and slender, similar to the female. A whole range of transitional forms exist form (a) to (b), with similar aedeagi as in (Fig. 61D). In all the descriptions and illustrations found in the literature, only the one type of aedeagus was illustrated (Fig 61E), which I have found only to occur in elongated males. This aedeagus form (Fig. 61D) occurs in species with widely dilated elytra, to the transitional forms and right up to the slender, and elongated elytral forms. So the problem that arises is that there are slender forms of *trabeatus* specimens that have both types of aedeagal forms (no transitional forms in the aedeagi occur). I have found no other elytral (or any other) characters, that distinguish between these two slender types. I have consulted two male "type" specimens from (ISNB), (i) with no aedeagus (ii) a completely different aedeagus form, not *trabeatus* (must be mistakenly put back on wrong species after extraction, by previous worker). Both these forms seems to occur together (not yet sure), two "sibling" species may exist. Further assumptions can only be made after further biological studies in the field, and by collecting males and females in copulation.

Host plant: *Allium cepa* (Gomes-Alves 1978).

Material examined

320 specimens examined.

ANGOLA: Angl. Afr Orient (1 MNHN). BOTSWANA: Nata (6 UPSA); Okavango Baro Riv. Chief (1 TMSA). ETHIOPIA: Erythree (1 ISNB). GUINEA: (1 ISNB). KENYA: Kekwezi (2 SAMC, 1 TMSA). MALAWI: Mangochi (12 TMSA); SE shore L. Nyasa Btw Ft Maguire and Ft Johnston (1 BMNH); MOZAMBIQUE: Porto Amelia (1 TMSA); Ressano Garcia (1 TMSA). NAMIBIA: Abachaus, Damaraland (22 TMSA); Abachaus, Otjivarongo (10 TMSA); Abenab, Grootfontein (1 SAMC, 1 SANC); Enana (1 UPSA); Erikson's Drift, Kunene (1 SAMC); Grootfontein (1 SANC); Joubertberge, 35km S Chopolo Kaokoveld (10 SMWH); Kalidonia (1 SMWH); Mafuta E. Caprivi (1 SMWH); Mangetti For. Betw. Tsumkwe-Chassie Kungveld (1 TMSA); Nama Pan, Boesmanland (2 SMWH);

Okahandja (1 SANC, 1 SMWH, 4 TMSA); Omaruru (1 SMWH); Ondonqua, Ovamboland (2 SAMC); Onirramba (1 SAMC); Otjikolo 33mls ENE Omaruru (1 BMNH); Otjitambi FM 27mls ESE Kamanjab (1 BMNH); Otjituo (1 SAMC); Otjiverongo (3 SAMC); Outjo, Delhi (4 SMWH); Outjo, Otjitambi (2 SMWH); Ovampo L. (1 SAMC); Rietfontein 23 mls SW Grootfontein (2 BMNH); Tsumeb (2 SMWH); Tsumkwe Kungveld (2 TMSA); Windhoek (4 SMWH). Windhoek Excelsior 286 (2 SMWH). SENEGAL: St. Louis (2 MNHN). SOUTH AFRICA: CP. Krabfontein (1 TMSA); Willowmore (2 TMSA); NAT. Empangeni (1 TMSA); TVL. Afguns, 22km S Ellisras (1 SANC); Bandolierskop (1 TMSA); Bobbejaansberg, 16Km NE Roodeplaat Dam (3 UPSA); Brits (1 UPSA); Bronkhorstspruit (1 UPSA); De la Rey (6 TMSA); Dendron (1 UPSA); Ellisras, Mogol Nat. Res; (1 SANC); Empangeni (1 TMSA); Enana (1 UPSA); Fount Grove (2 TMSA); Groblersdal (1 UPSA); Groot Letaba Wildresevaat (1 UPSA); Hartebeespoortdam (1 UPSA); Klaserie (1 UPSA); Klerksdorp, Makokskraal (1 UPSA); Kosterdam (2 UPSA); Langjan Nat. Res; (4 SANC); Letaba (1 TMSA); Linokana Tvl (2 MNHN); Loskop (8 TMSA); Middelburg (1 UPSA); Minastune (1 TMSA); Moordrift (3 TMSA); Moreleta Trail (1 UPSA); Naboomspruit (14 SANC, 1 TMSA); Nelspruit (1 UPSA); Nylstroom, Nylsvlei (1 SANC); Ottosdal (1 UPSA); Pienaarsrivier (2 TMSA, 1 UPSA); Pietersburg (1 TMSA, 1 UPSA); Platriver, Waterberg distr; (4 TMSA); Pretoria (5 SANC, 6 UPSA); Pumulani (1 UPSA); Renosterpoort Farm (2 TMSA); Roodeplaat dam (4 SANC); Saartjiesnek (33 UPSA); Skukuza (1 UPSA); Soutpan (3 SANC); Steelpoort (2 TMSA); Swartkop Limpopo (3 TMSA); Warmbad (3 SANC); Waterberg Farm 223 (14 TMSA); Willowmore (2 TMSA); Wonderboom (1 UPSA); Zebediela (1 TMSA); Zeerust (1 SANC). SWAZILAND: M'Babane (1 SANC). TANZANIA: Nguelo Usambara (1 ISNB). ZAIRE: (2 ISNB); Banana (2 ISNB); Banana Boma (2 ISNB); Boma Sundi (2 ISNB); Luki Mayombe (3 ISNB). ZAMBIA Zambeze (1 MNHN); Zambeze Nova Chupanga (4 MNHN). ZIMBABWE: Bulawayo (1 TMSA); Harare, "Salisbury" (1 TMSA); Livingstone NW (2 SANC); Mutambana, Metsetter (1 TMSA); Sebakwe (10 SAMC, 1 SANC); Umtali (1 SAMC); Victoria Falls (1 SANC).

Geographical distribution (Fig. 60)

Angola, Botswana, Ethiopia, Guinee, Kenya, Malawi, Mozambigue, Namibia, Senegal, South Africa (Cape, Natal and Tvl), Swaziland, Tanzania, Zaire, Zambia and Zimbabwe.

Diagnosis

This species (Fig. 58) is easily recognized by the greatly dilated, semi-circular elytra (with associated large epipleura ventrally), with black ("fingerprint) markings. Two types occur (see discussion).

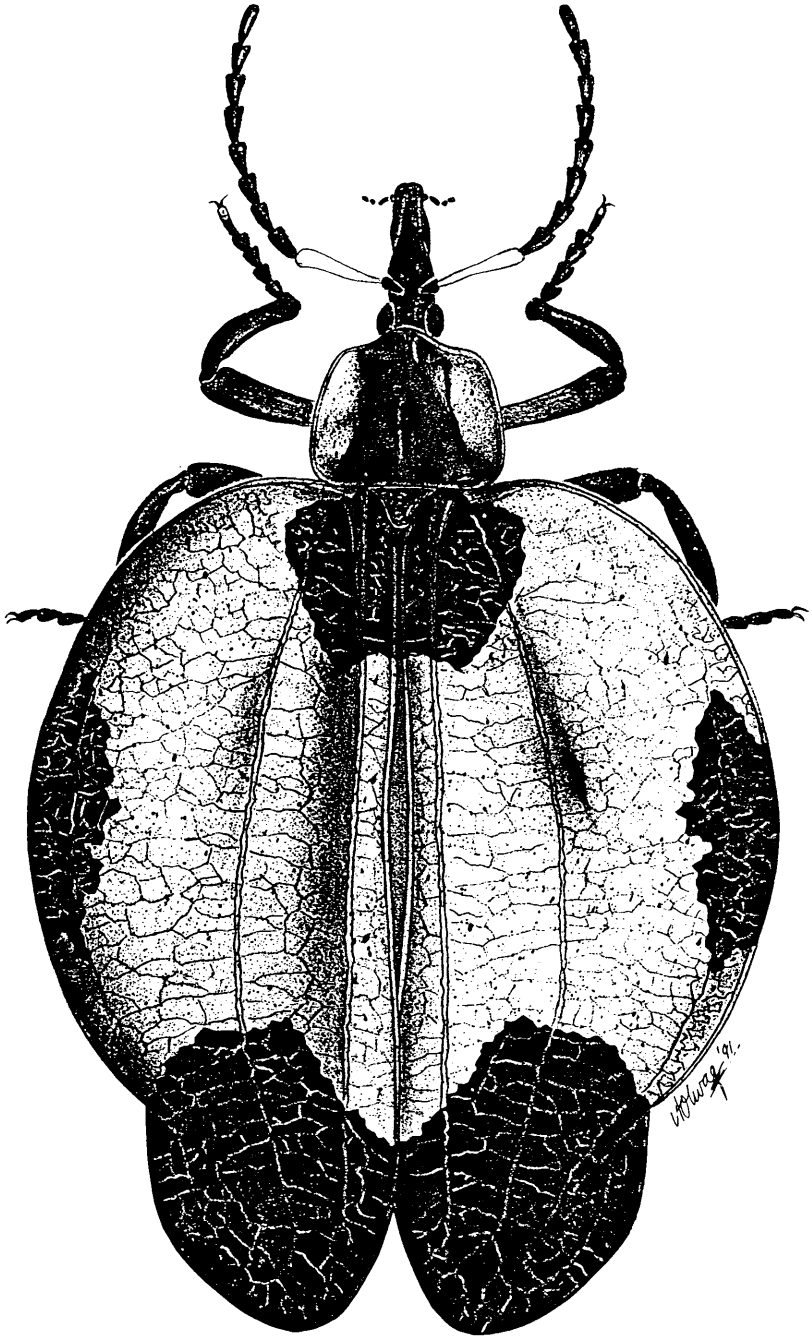


Figure 58: *Lycus (Chlamydolycus) trabeatus* Guérin-Méneville.

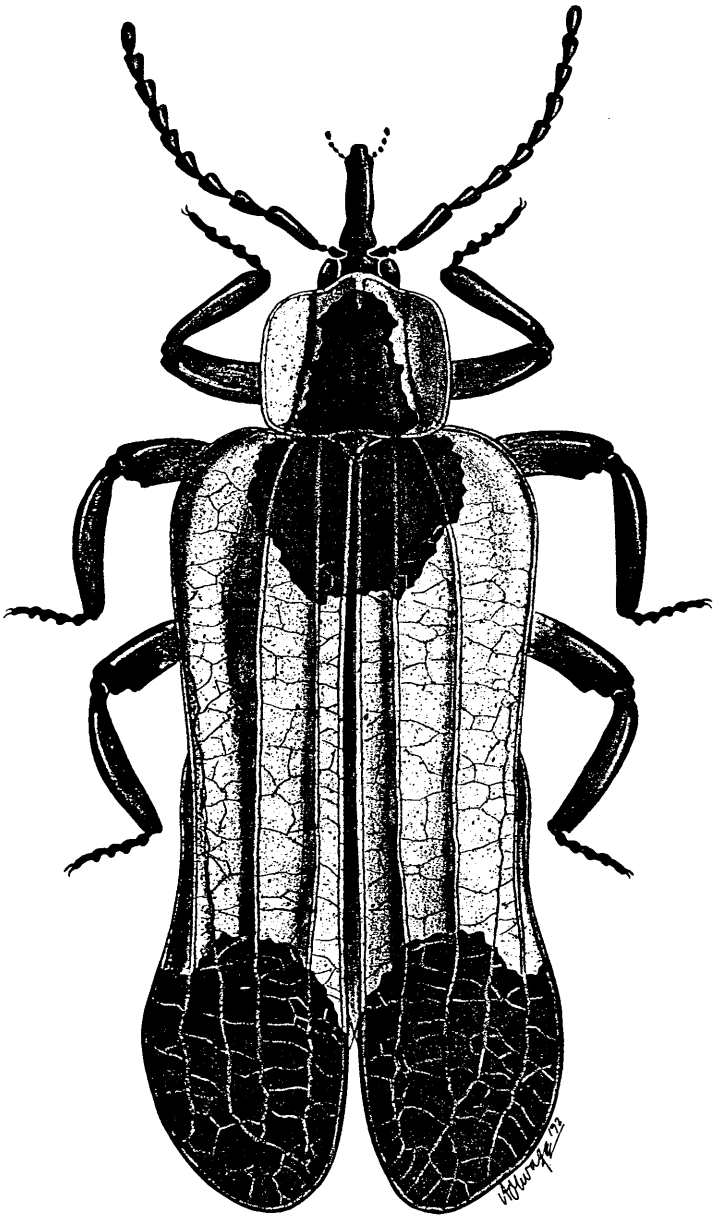
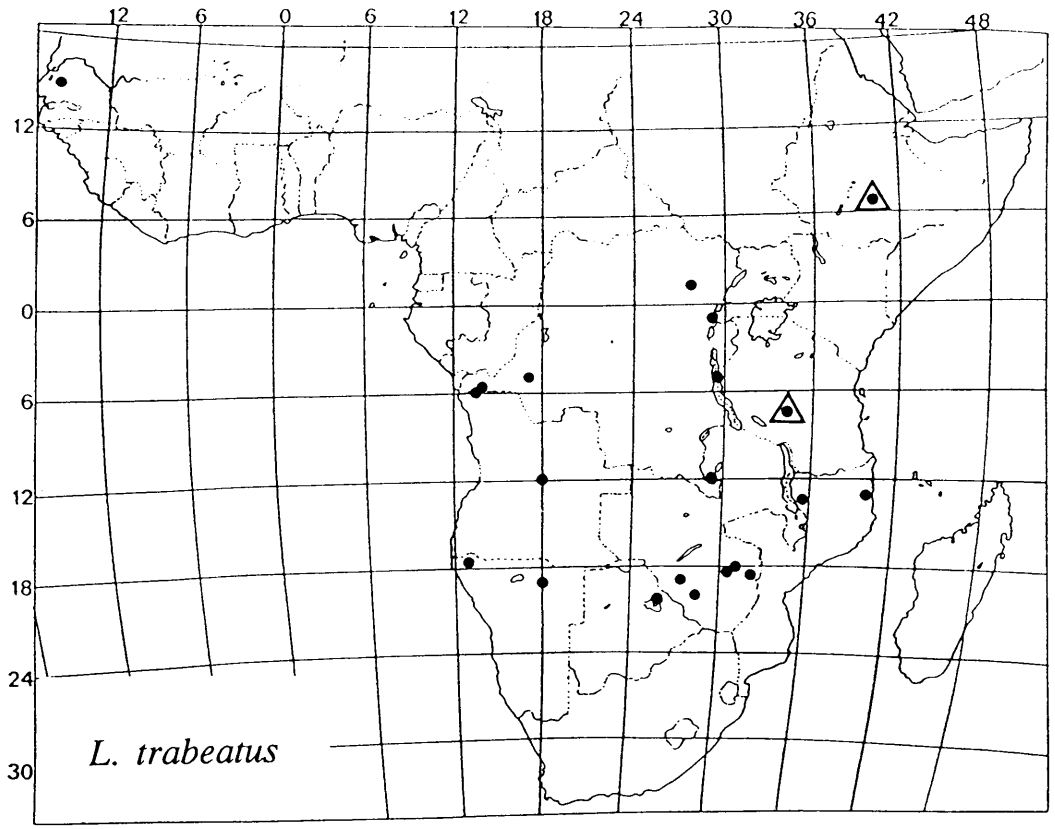


Figure 59: *Lycus (Chlamydolycus) trabeatus* Guérin-Méneville.



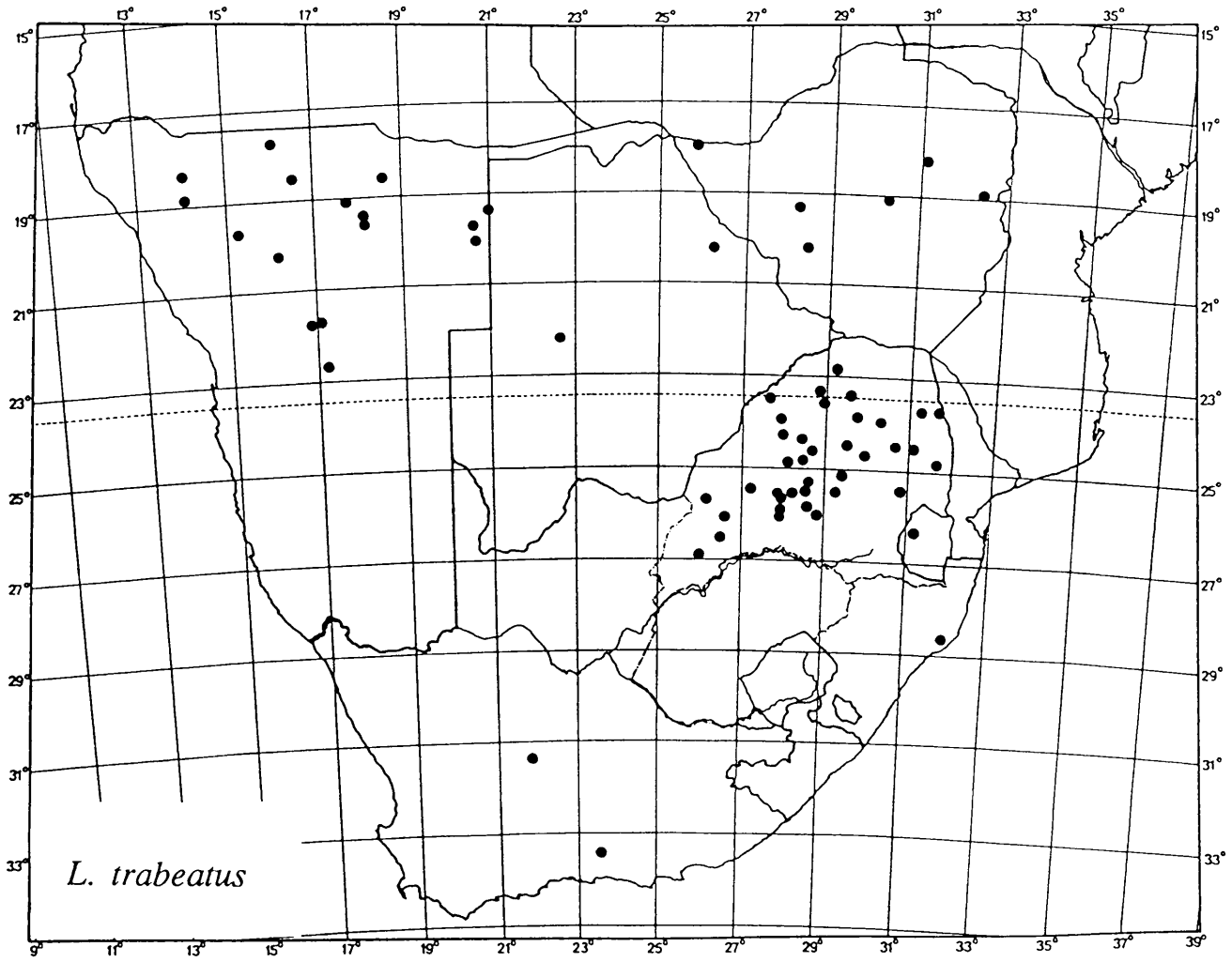


Figure 60A & B: Distribution of *Lycus trabeatus*.

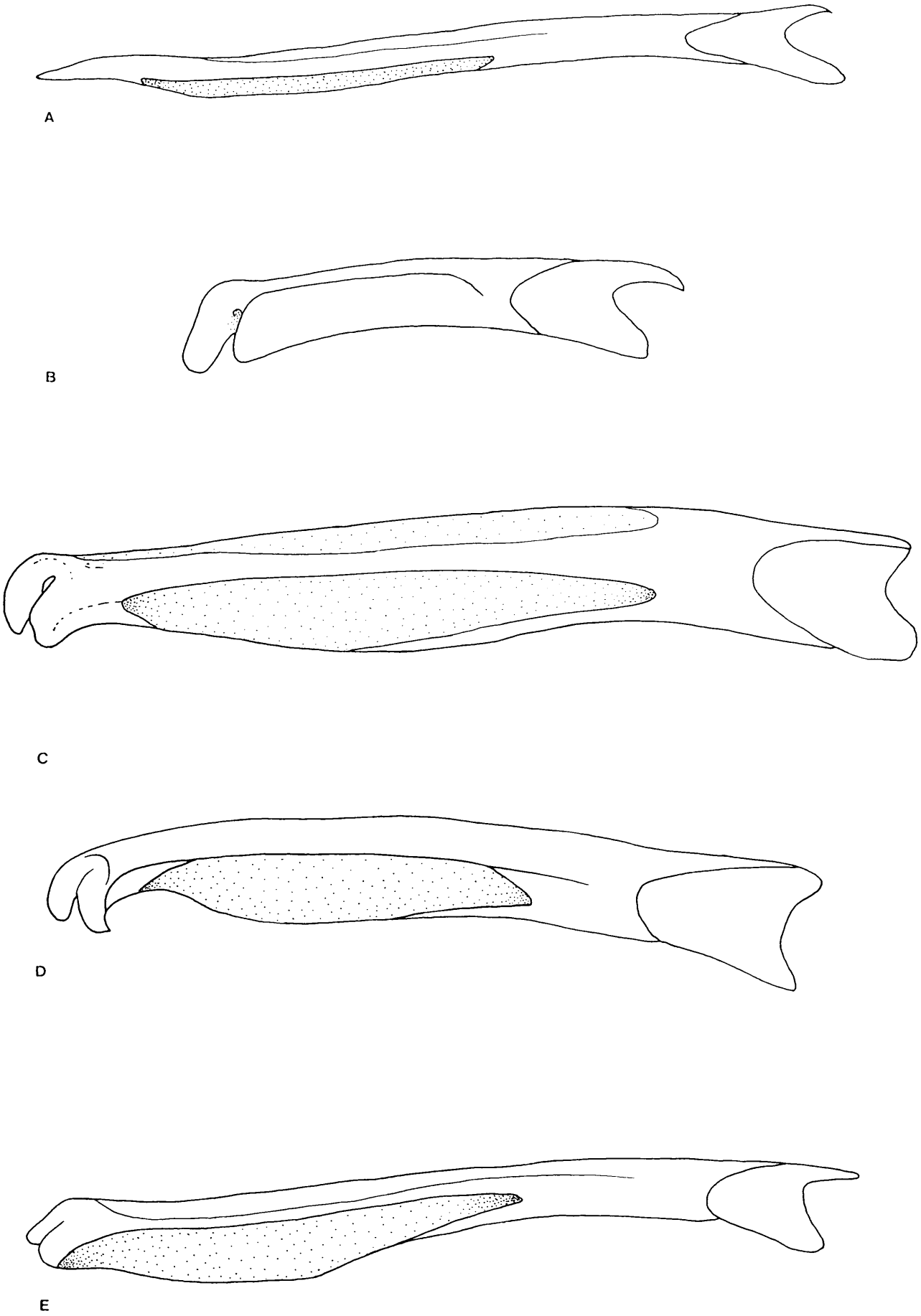


Figure 61A - E: Male genitalia: - **A** *L. distanti*. - **B** *L. poultoni*. - **C** *L. subtrabeatus*. - **D** *L. trabeatus*. - **E** *L. trabeatus*.

5.5.6 Species of the subgenus *Haplolycus*.

Lycus (Haplolycus) agrestis Bourgeois

(Figs 62, 63 & 66A)

Lycus agrestis Bourgeois, 1902: 742; Kleine 1933: 11; Pic 1938: 150 (v. *caffrarius*).

conformis Bourgeois, 1902: 743; Kleine 1933: 11. **syn. nov.**

congener Gerstaecker, 1871: 55; 1873: 154; Bourgeois 1883b: 632; 1901: 47; 1902: 742 (v. *scutellaris*); 1908c: 111; Kleine 1933: 11; 1937: 82. **syn. nov.**

TYPE: No type specimens traced.

Redescription

MALE

Size: length 14,0-20,0 mm; hum. width 5,0-6,0 mm; width 6,0-11,0 mm.

Head: transversely depressed between eyes forming two pits.

Rostrum: long and slender; 2,10-2,50X distance between eyes.

Antennae: 4-10 serrate; 3>4+5; 10<11 (11 elongated).

Maxillary palpi: long and slender, last segment depressed apically.

Colouration: head, antennae, legs, mesal part of abdomen and pronotum, scutellar area (varying) and posterior 1/2 to 1/3 of elytra, black; rest of pronotum, abdomen and elytra ochraceous (Fig.62).

Pronotum: broader than long, 1:1,35-1,45; anterior angles greatly obtuse, anterior angle ridged; posterior angles acutely pointed and reflexed.

Elytra: subparallel, elongated; sides slightly dilated from humeral area posteriorly; extremities ovally rounded; sutural margin straight; costae 1, 2 and 4 prominent, 4th continuous with the humeral margin; 3rd visible; a fine reticulate network between costae (Fig. 62).

Abdomen: penultimate segment transverse, posterior margin arched mesally; last segment triangular.

Legs: simple.

Male genitalia: small, short and broad; parameres broad and visible; median lobe depressed laterally, apex furcately pointed ventrally (Fig. 66A).

FEMALE

Size: length 19,0 mm; width 8,0 mm.

The form and colouration of the elytra similar to the male.

Discussion

According to Bourgeois (1902) similar to *L. dalmani* Bourgeois, but can be distinguished by the form being larger and robust, and the rostrum broader and shorter. The pronotum is more transverse, the costae prominent separated by larger intervals, more punctate and black scutellar colouration. No *L. dalmani* specimens have been examined.

Pic (1938) described a variation nl. *caffrarius* the form being slightly more elongated and the prothorax less "retracted".

According to Bourgeois (1902) (1 Male; 1 Female) examined from Natal, very similar to *L. congener* Gerstaecker. *L. conformis* Bourgeois and *L. congener* Gerstaecker are synonymized with *L. agrestis* because of: (a) the overall similarity in elytral shape and colouration, (b) the similar aedeagal form and (c) the same distribution range. No "type" material has been examined, but this is very clear from the illustrated literature cited.

The two "type" specimens examined from (ISNB) are from Grahamstown and not Uitenhage as mentioned in the original description and are therefore not considered valid.

Material examined

54 specimens examined.

MOZAMBIQUE: Env. de Beira, Manga (1 MNHN); SOUTH AFRICA: CP. Goshen nr Cathcart (1 SAMC); Grahamstown (2 ISNB); Knysana (3 TMSA); Resolution, Albany (18 TMSA); Resolution, Grahamstown (6 SAMC); NAT. (1 UPSA; 1 SAMC); Port Edward (3 UPSA); Durban (2 SAMC; 1 SANC); Impingo (1 SAMC); Malvern (1 SAMC); Pietermarizburg (1 SAMC); TVL. Allerton (1 SANC); ZAIRE: Bumba (1 MRAC). Sanga (1 ISNB); Vaku Luzi (1 ISNB). ZIMBABWE: Chirinda For. (1 TMSA); Mt. Selinda (1 TMSA); Mt. Selinda, Chirinda For. (1 SANC). Locality not traced: Zambeze Nova Choupanga, Pres Chemba (1 MNHN). No locality (4 SAMC).

Geographical distribution (Fig. 63)

Cameroun, Congo, Ethiopia (Abyssinie), Mozambique, Somalia, South Africa (Cape, Natal and Tvl), Tanzania, Zaire and Zimbabwe.

Diagnosis

Diagnosed by the elongated elytral form with prominent costae, black colouration, as well as the form of the aedeagus.

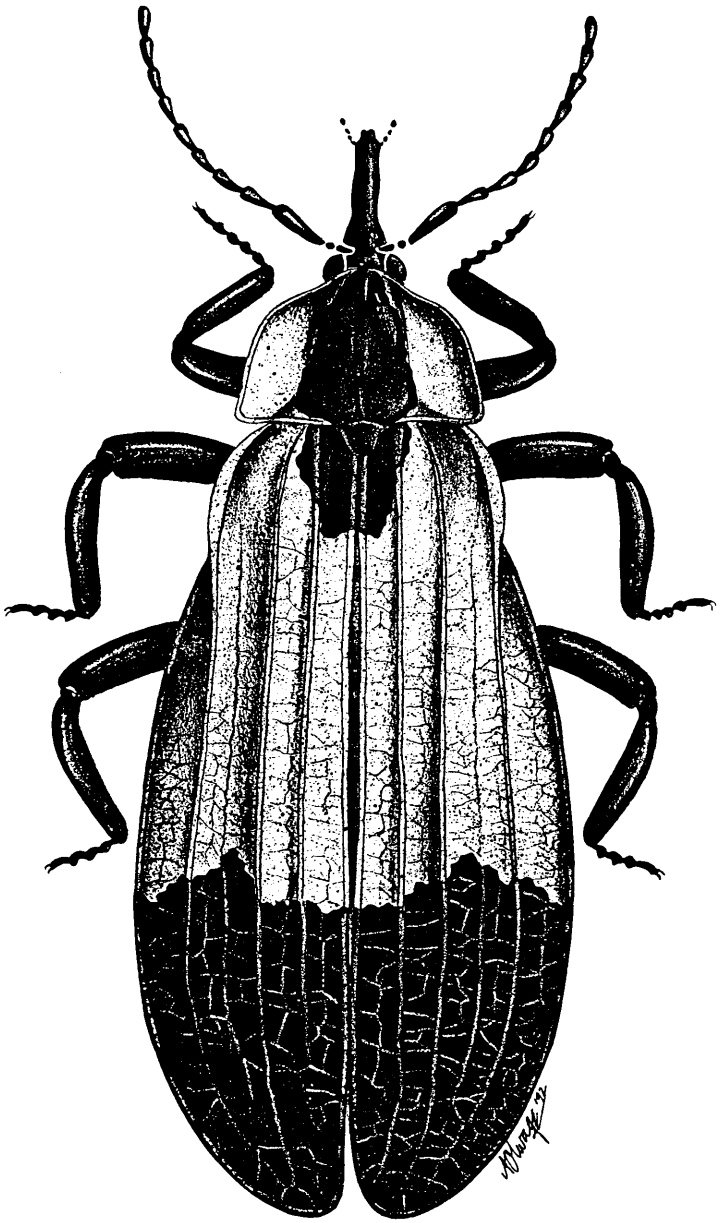
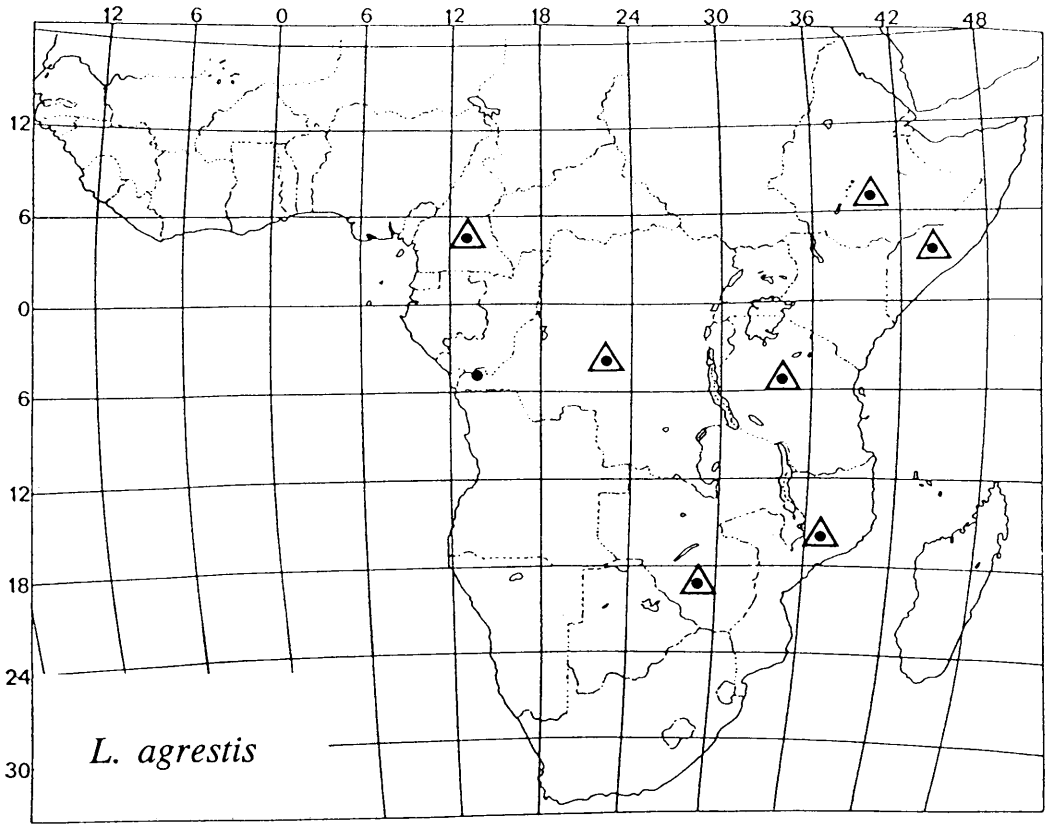


Figure 62: *Lycus (Haplolycus) agrestis* Bourgeois.



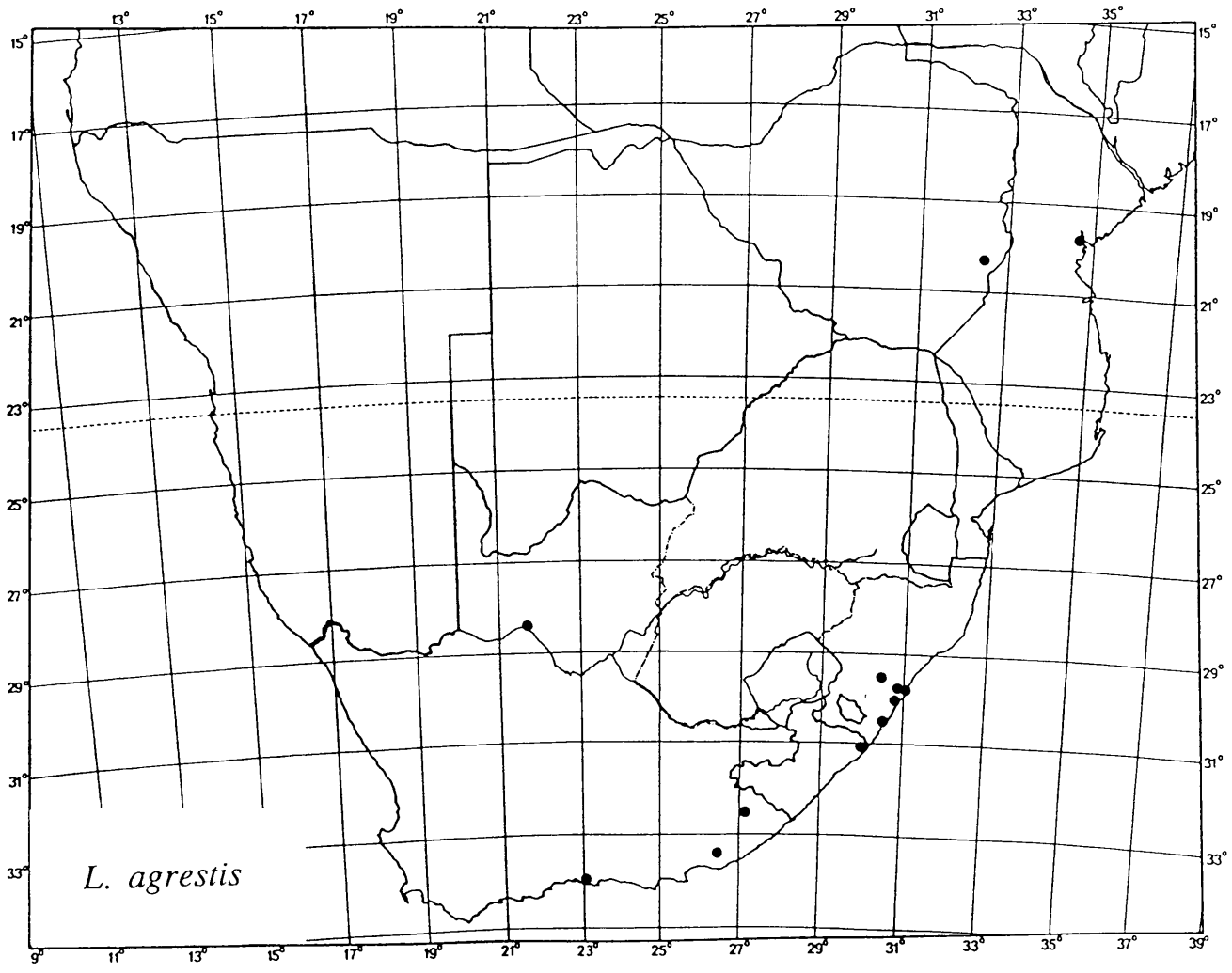


Figure 63A & B: Distribution of *L. agrestis*.

Lycus (Haplolycus) scrobicollis Fåhraeus

(Figs 64, 65 & 66B)

Lycus scrobicollis Fåhraeus, 1851: 435; Kleine 1933: 12; 1937:93.

fastiditus Bourgeois: 1885: 102; 1905: 190; Kleine 1933: 12. Gomes-Alves 1959: 115. **syn. nov.**

TYPE: No types traced.

Redescription

MALE

Size: length 11,0-18,0 mm; hum. width 4,0-5,0mm; width 3,5-5,0 mm.

Head: transversely depressed between eyes, forming two deep pits.

Rostrum: long and slender, 2,30-2,45X distance between the eyes.

Antennae: 4-10 serrate, compressed; 3>4+5; 10<11, (11 broad).

Maxillary palpi: long and slender, last segment broadly depressed apically.

Colouration: head, antennae, legs, mesal part of pronotum and abdomen, and posterior 1/3 to 1/4 black; rest of pronotum, abdomen and elytra ochraceous (Fig. 64).

Pronotum: transverse (hood-shaped), 1:1,30-1,55; anterior angles obtuse, anterior ridged; posterior angles acutely reflexed.

Elytra: subparallel, elongated; sides slightly dilated; sutural margin straight, extremities obtusely perpendicular; costae 1, 2 and 4 prominent, with the 4th costa continuous with the lateral humeral margin, 3rd costa indistinct; a fine reticulate network between costae (Fig. 64).

Abdomen: penultimate segment transverse, lateral margins protruding posteriorly, posterior margin arched mesally; last segment triangularly elongated.

Legs: simple.

Male genitalia: short and broad; parameres broad and clearly visible; median lobe broad and slightly curved, broadly pointed at apex, with obtuse indentation ventrally. (Fig. 66B)

FEMALE

Size: length 15,0 mm; width 7,0 mm.

Elytral form and colouration similar to the male.

Discussion

L. fastiditus Bourgeois is synonymized with *L. scrobicollis*. The colour and form of the elytra and the form of the aedeagus is similar. The distribution range is partly sympatric (which might be due to the fact that both species seem to be very rare). The form of the aedeagus is completely similar. From the well illustrated literature on *L. kapanganus* Pic this species may also be a synonym, but without examining any specimens no further predictions can be made.

Material examined

22 specimens examined.

CAMEROUN: Mukonje Farm (3 ISNB). NAMIBIA: Outjo (1 SAMC). SOUTH AFRICA: NAT. (2 SAMC); TVL. Mogol Nat. Res., Ellisras distr. (11 SANC). ZAIRE: Bambesa (2 MRAC).; Lulua, Kapanga (1 MRAC); Stanleyville (1 ISNB). ZIMBABWE: Sebakwe (1 SAMC).

Geographical distribution (Fig. 65)

Cameroun, Central African Republic, Mozambique, Namibia, Senegal, South Africa (Natal and Tvl), Zaire and Zimbabwe.

Diagnosis

Elytra elongated with a distinct aedeagus.

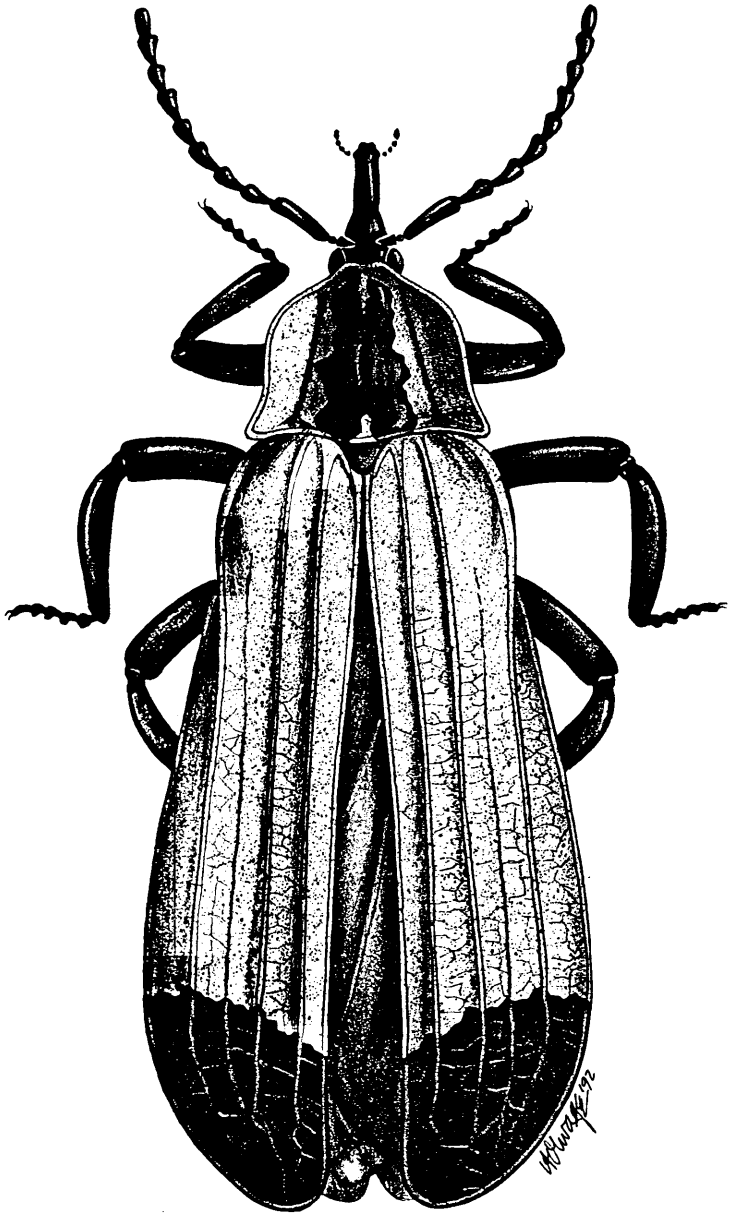
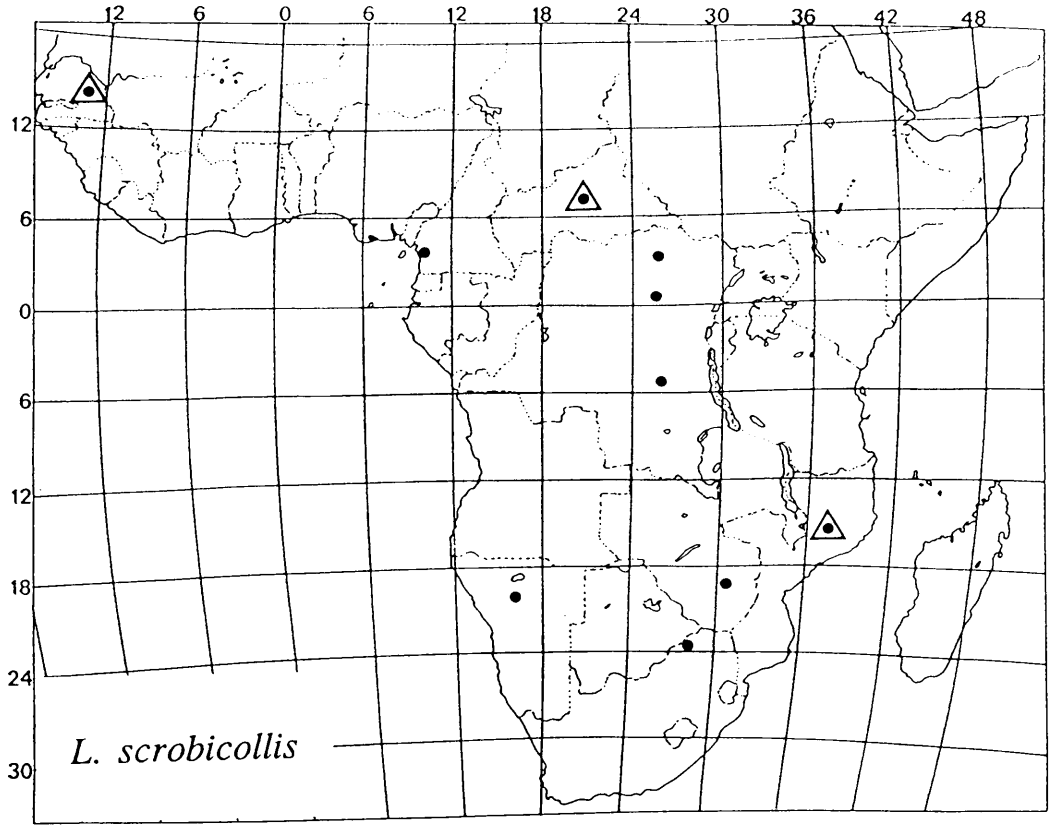


Figure 64: *Lycus (Haplolycus) scrobicollis* Fåhraeus.



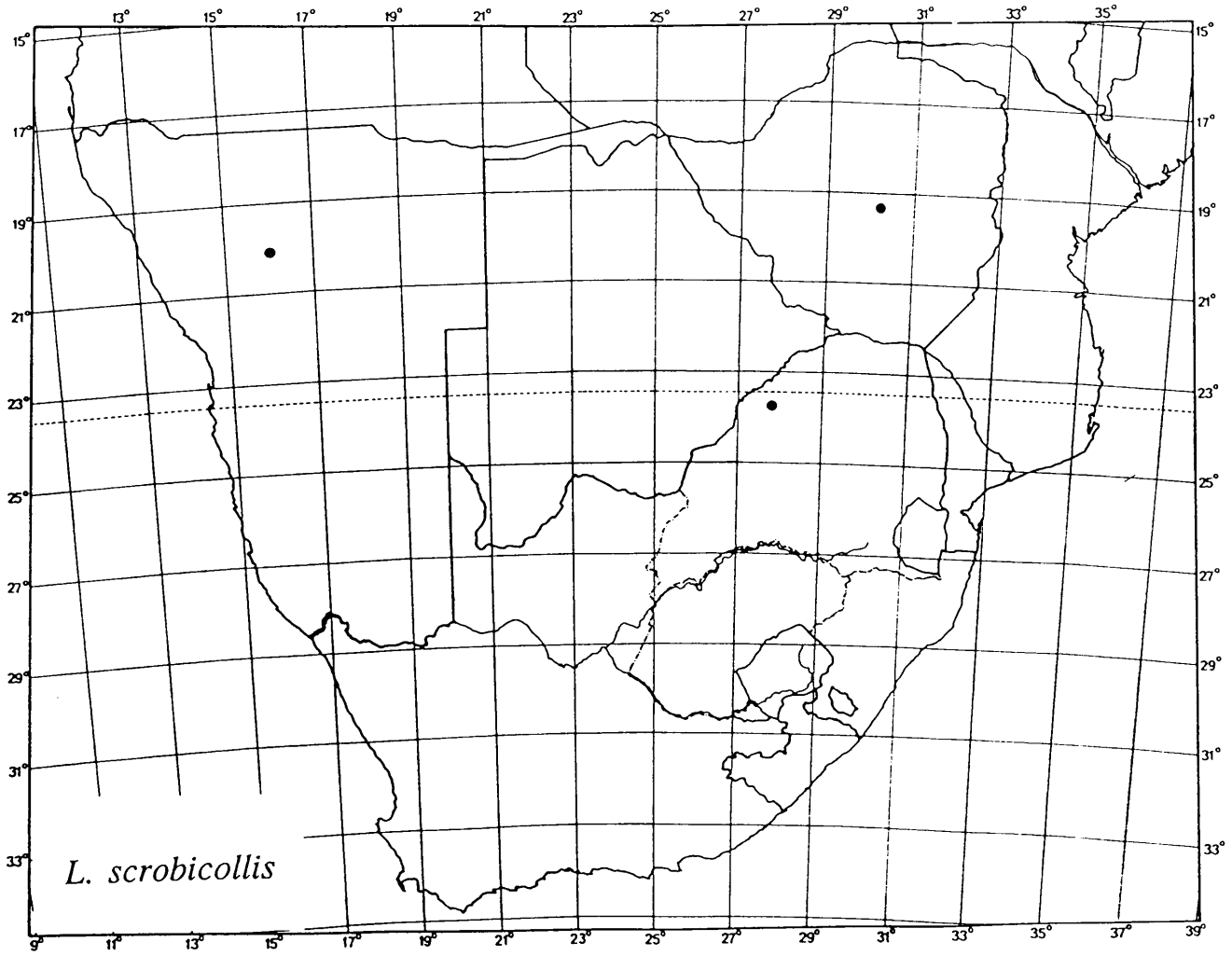
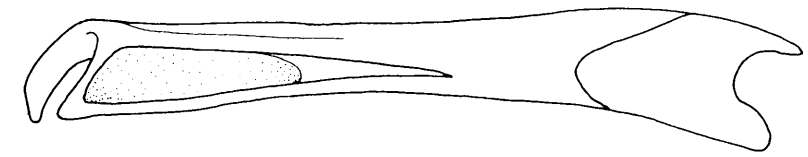
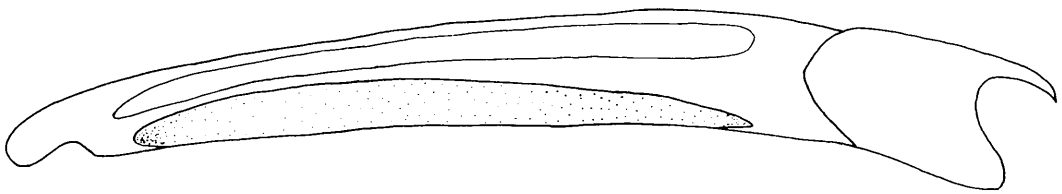


Figure 65A & B: Distribution of *L. scrobicollis*.



A



B

Figure 66A & B: Male genitalia. - **A** *L. agrestis*. - **B** *L. scrobicollis*.

5.5.7 Species of the subgenus *Merolycus*.

Lycus (Merolycus) chirindanus Kleine

(Figs 67 & 79A)

Lycus chirindanus Kleine, 1939: 273.

TYPES: 2 PTS (1 male, 1 female): Paratypus 638; Chirinda, Mashonal'd Oct'05, G.A.K. Marshall; ex coll. Kleine (ZMPA).

Redescription

MALE

Size: length 8,0-10,0 mm; hum. width 2,5-3,0 mm; width 4,5-6,0 mm.

Head: transversely depressed between eyes forming two deep pits.

Rostrum: very long and slender, 2,65- 2,75X distance between eyes.

Antennae: 5-10 serrate and compressed; 3>4+5; (3=4-6); 10<11.

Maxillary palpi: small and slender, last segment apically depressed.

Colouration: head, antennae, legs, mesal part of pronotum, abdomen (varying from completely black to black mesally, sides ochraceous), and posterior 1/2 of elytra (dentate edge) black; rest of pronotum and elytra ochraceous.

Pronotum: broader than long (hood-shaped), 1:1,50-1,55X; anterior angles obtusely rounded; anterior slightly ridged; posterior angles acutely pointed, and reflexed; sides reflexed.

Elytra: glabrous; elongated, sides slightly dilated; sutural margin straight, with sutural angles right-angled; costae 1, 2 and 4 prominent, 3rd indistinct but visible; fine, irregular reticulate network between costae.

Abdomen: penultimate segment transverse, posterior margin arched mesally; last segment triangular.

Legs: Hind femora thickened and strongly toothed, tibia toothed; front and middlelegs simple.

Male genitalia: small parameres very closely fused and hardly visible; median lobe slightly depressed laterally; apically curved, ventrally obtusely indented (Fig. 79A).

FEMALE

Size: length 9,0-10,0 mm; width 6,0-6,5 mm.

Elytra similar in form and colouration to male; legs simple.

Discussion

Kleine (1939) in his original description examined two males and one female. I examined two paratypes (1 male and 1 female). In the male specimen, the mouth parts (maxillary and labial palpi), and last two abdominal segments were damaged.

Small elongated species, very similar to the elytra of the subgenus *Haplolycus*, but distinguished as *Merolycus* by the thickened, toothed hind femora. This seems to be a very rare species.

Material examined

8 specimens examined.

SOUTH AFRICA: NAT. Kosi Bay (6 UPSA).

Geographical distribution (Fig. 67)

South Africa (Natal) and Zimbabwe.

Diagnosis

Easily distinguished by the form of the aedeagus associated with the elongated and apically black colouration of the elytra and the thickened, toothed hindlegs (fore-and middlelegs simple).

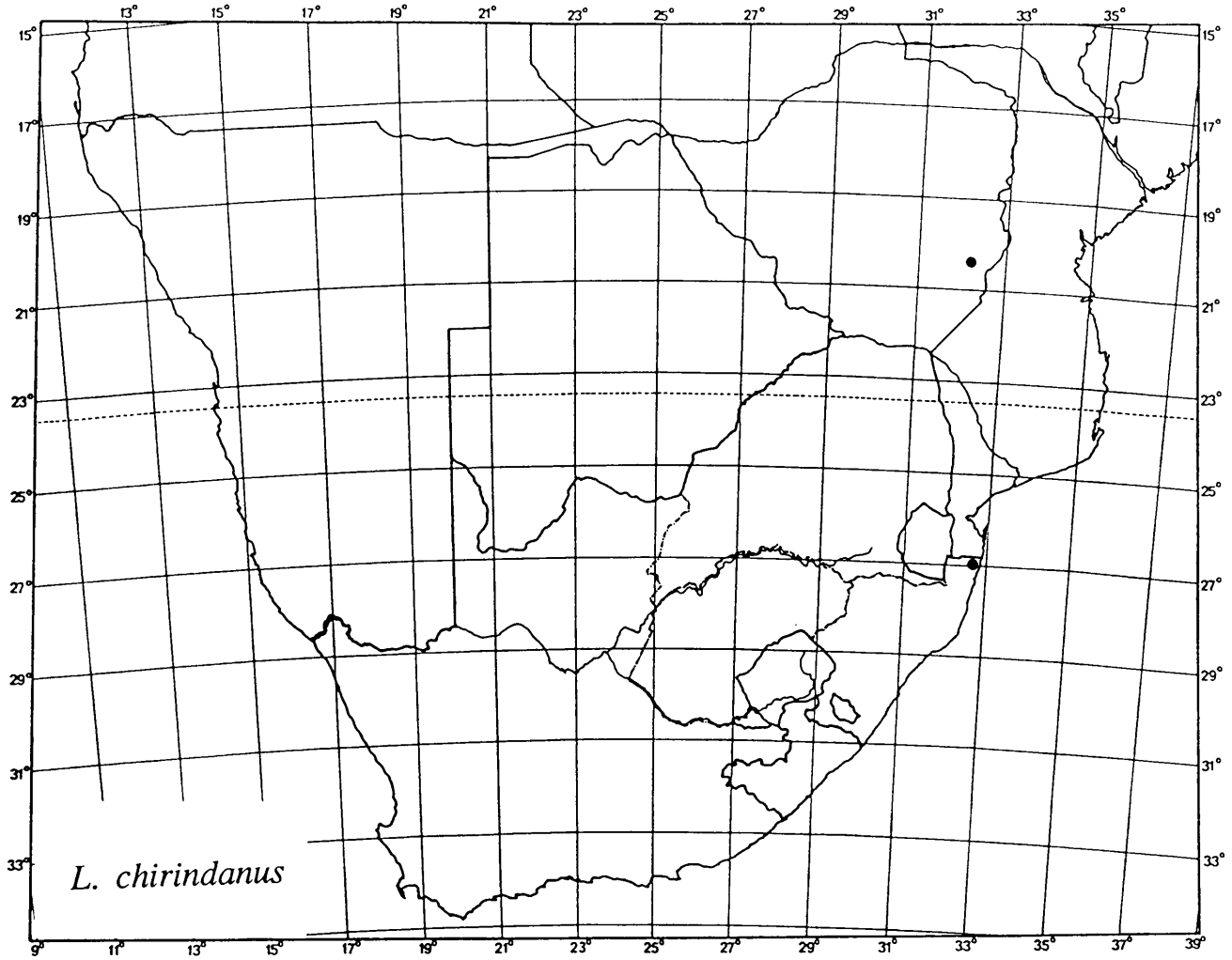


Figure 67: Distribution of *L. chirindanus*.

Lycus (Merolycus) humerosus Fåhraeus

(Figs 68, 69 & 79B)

Lycus humerosus Fåhraeus, 1851: 429; Bourgeois 1883a: 61; Kleine 1933: 12; Gomes-Alves 1967: 53.

TYPE: No types traced.

Redescription

MALE

Size: length 13,0-18,0 mm; hum. width 8,5-14,0 mm; width 9,5-14,5 mm.

Head: moderately depressed between eyes, forming two pits.

Rostrum: long, and broad 1,85-2,10X distance between eyes.

Antennae: 4-10 serrate; 3<4+5; 10<11.

Maxillary palpi: slender; last segment broadly depressed apically.

Colouration: antennae, head, legs, mesal part of pronotum and abdomen, antero-mesal humeral area of elytra, posterior 1/3 of elytra black; rest of elytra, abdomen and pronotum ochraceous (Fig. 68).

Pronotum: transverse, 1,20-1,50X; subrectangular with antero-lateral angles obtuse; anterior angle ridged; posterior angles obtusely right-angled; sides slightly reflexed.

Elytra: glabrous; sides of anterior 1/2 dilated, slightly reflexed forming so-called "wings", with latero-posterior margins terminating into 2 bluntly, pointed "teeth"; ventrally well developed epipleura; posterior 1/2 of elytra dilated, circularly; extremities rounded, sutural angles subperpendicular; sutural margin dilated posteriorly (overlapping); costae 1 and 2 are prominent, costae 3 and 4 indistinct, obsolete in humeral area; reticulate cells between costae indistinct (Fig. 68).

Abdomen: penultimate segment transverse, posterior margin straight; last segment short and triangular.

Legs: front legs transversely thickened with femur bearing slightly thickened weak tooth apically, while tibia is slightly indented proximately; middle- and hindlegs simple.

Male genitalia: stout; median lobe simple, curved and pointed apically; parameres small, closely fused and indistinct (Fig. 79B).

FEMALE

Size: length 14,0-18,0 mm; width 8,0-9,0 mm.

Colouration similar to that of male, slightly elevated elytral dilations anteriorly (not as extreme as in male), posterior form much more elongated; legs simple.

Discussion

This species is relatively rare in the southern parts of Africa. No other similar species are known.

Material examined

32 specimens examined.

SOUTH AFRICA: NAT. (2 MNHN; 1 TMSA); Bulwer (1 TMSA); Champagne Castle (1 TMSA); Drakensberg (1 UPSA); Durban (1 ISNB; 1 MNHN; 2 SAMC; 2 SANC; 1 TMSA); Frere (1 SANC); Malvern (3 SAMC); Pietermaritsburg (1 TMSA); TVL. Blouberg (1 TMSA); Haenartsburg (5 TMSA); Lake Funduzi (1 TMSA); Louis Trichardt (1 SAMC); Lydenburg (1 SANC); Witrivier (1 SANC); Malta Forest nr. The Downs (1 SANC). TRANSKEI: Umtata (1 TMSA). ZIMBABWE: Mt. Selinda, Chirinda Forest (1 SANC; 1 TMSA).

Geographical distribution (Fig. 69)

Zimbabwe, South Africa (NE Tvl, Natal, E & Central Cape and Transkei).

Diagnosis

This species is easily recognised by its lateral, dilated elytral "wings", with blunt apical "teeth", and a simple, stout, apically curved aedeagus.

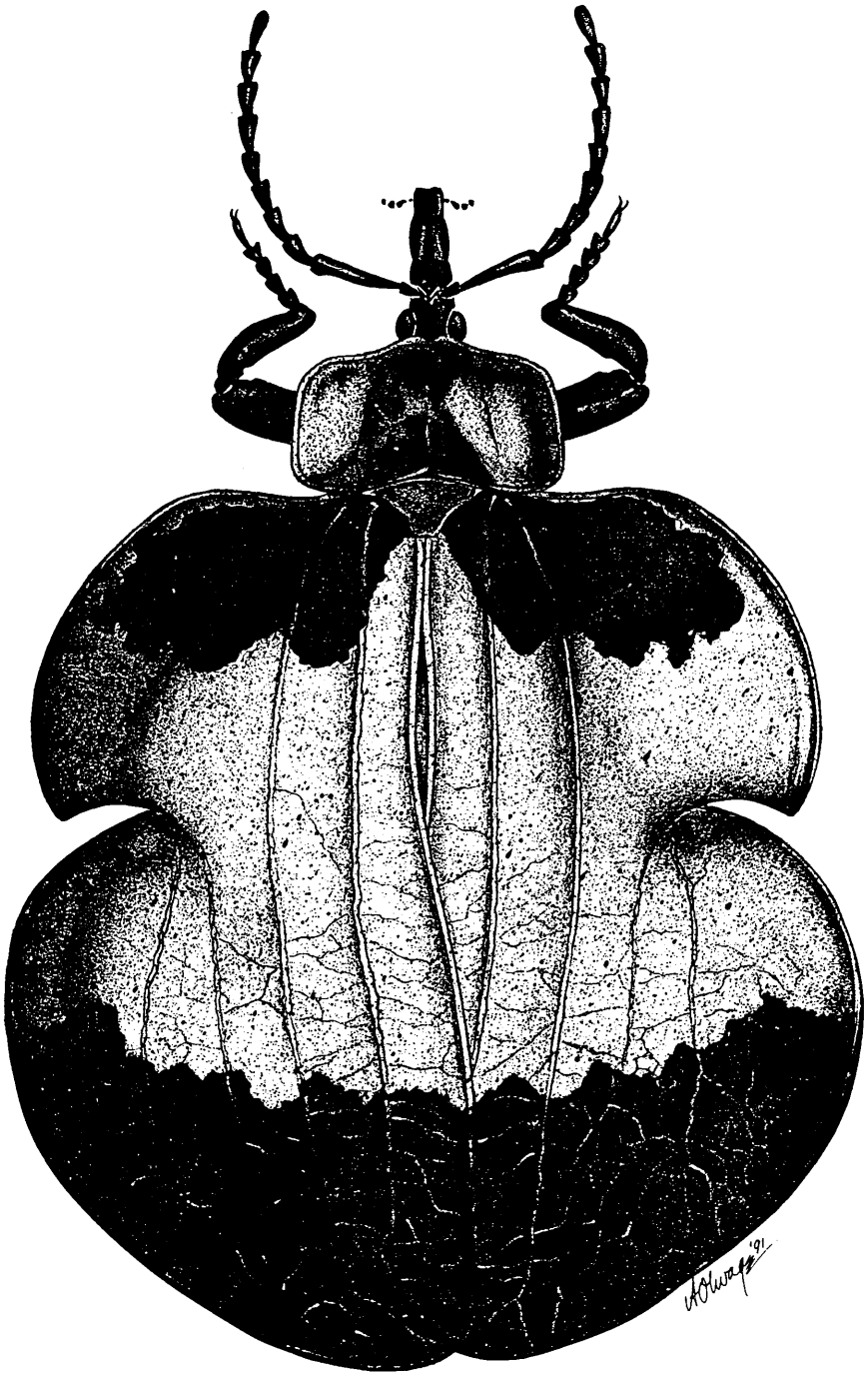


Figure 68: *Lycus (Merolycus) humerosus* Fåhraeus.

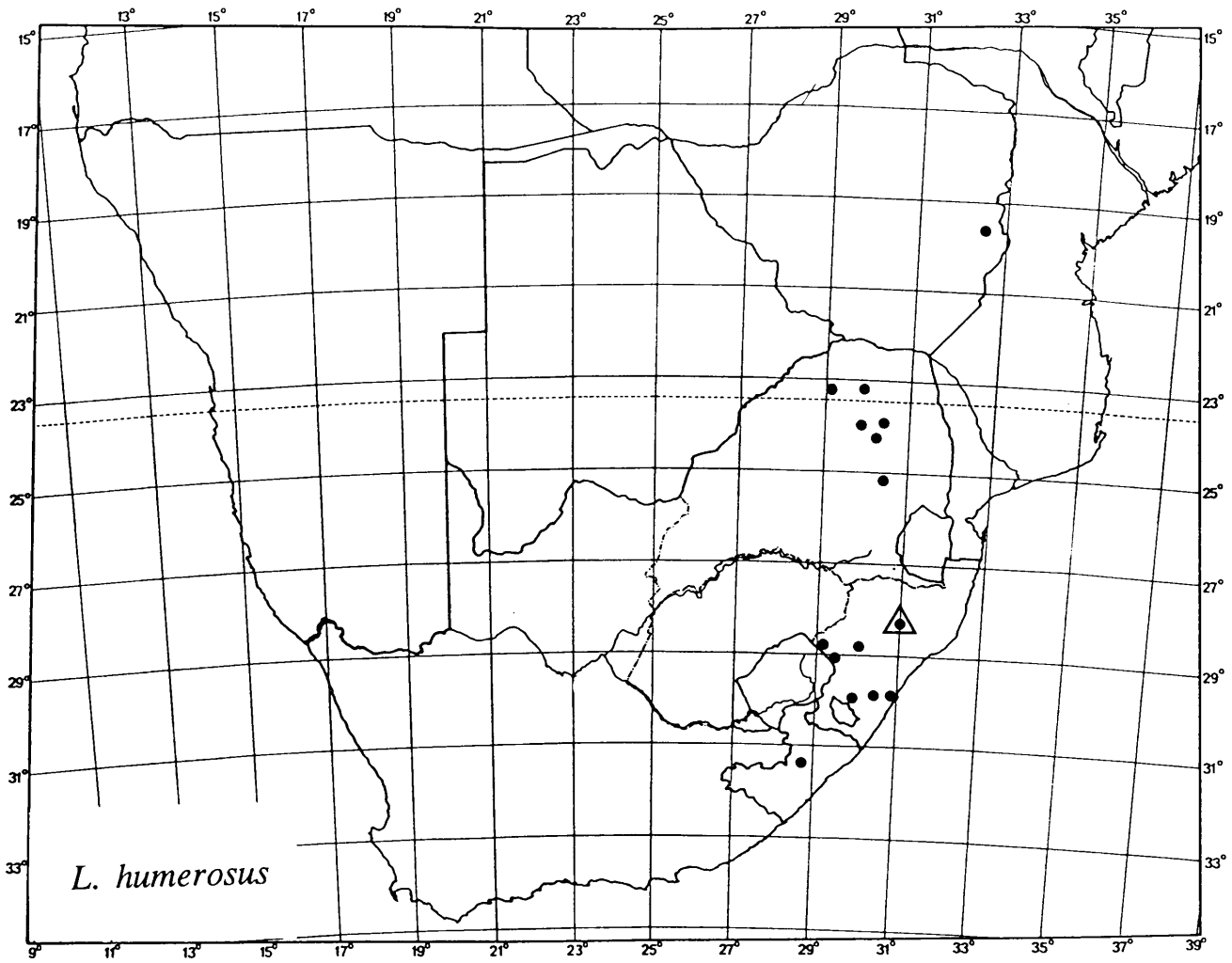


Figure 69: Distribution of *L. humerosus*.

Lycus (Merolycus) podagricus Bourgeois

(Figs 70, 71 & 79C)

Lycus podagricus Bourgeois, 1902: 741; 1908c: 109; Kleine 1933: 13; 1937: 96.

TYPE: No type specimen could be traced.

Redescription

MALE

Size: length 12,5-18,0 mm; hum. width 4,5-7,0 mm; width 7,0-10,0 mm.

Head: transversely depressed between eyes, forming two deep pits.

Rostrum: long; 2,00X-2,25X distance between eyes.

Antennae: 5-10 serrate; 3<4+5; 10<11 (11 elongated).

Maxillary palpi: long and slender; apical segment slender, broadly flattened apically.

Colouration: head, antennae, legs (varying), mesal part of pronotum and abdomen (varying from completely ochraceous to sides only), apical 1/3-1/4 of elytra and scutellar area, black; rest of pronotum and elytra ochraceous (Fig. 70).

Pronotum: broader than long; 1:1,65-1,70X; anterior angles greatly obtuse (anterior rounded form), anterior margin slightly ridged; posterior angles acutely pointed and reflexed laterally, posterior margin straight.

Elytra: elongated with a slightly rounded humeral area (anterior 1/3 of elytra), more elongated than dilated; posteriorly elytra slightly dilated (ovally-rounded); extremities ovally-rounded, slanting mesally; sutural margin straight; costae 1, 2 and 4 distinct (4th continuous with lateral humeral dilated margin), 3rd indistinct, with an irregular network of indistinct reticulate cells between costae (Fig. 70).

Abdomen: penultimate segment transverse, posterior margin arched, slightly indented mesally; last segment slightly triangularly elongated.

Legs: hind femora thickened and toothed (spinose), tibia slender with slight spines; fore- and middlelegs simple.

Male genitalia: stout, median lobe furcate, broad and curved apically; parameres visible but closely associated with median lobe (Fig. 79C).

FEMALE

No specimens examined.

Discussion

According to Kleine (1937), this is a large species (size), with spines on the hind femora, which is typical of the subgenus, and that the species is very rare in the material from the Congo (Zaire) museum. I have only examined two specimens.

This species is very similar to *L. scapularis* Murray, but differs by: (a) elytral form and black colouration (*scapularis* with elytra more elongated and posteriorly lateral margins more parallel), (b) thickened hindlegs (*scapularis* both middle- and hindlegs thickened), (c) form of the aedeagus completely different.

Material examined

2 det. specimens examined.

ZAIRE: Bambesa (1 MRAC); Kivu, Mulungu (1 MRAC); Kunda (Kinda?) (1 ISNB).

Geographical distribution (Fig. 71)

Tanzania, Uganda, Zaire, Zimbabwe.

Diagnosis

Easily distinguished by the form of the aedeagus, elongated elytral form and thickened and toothed hindlegs.

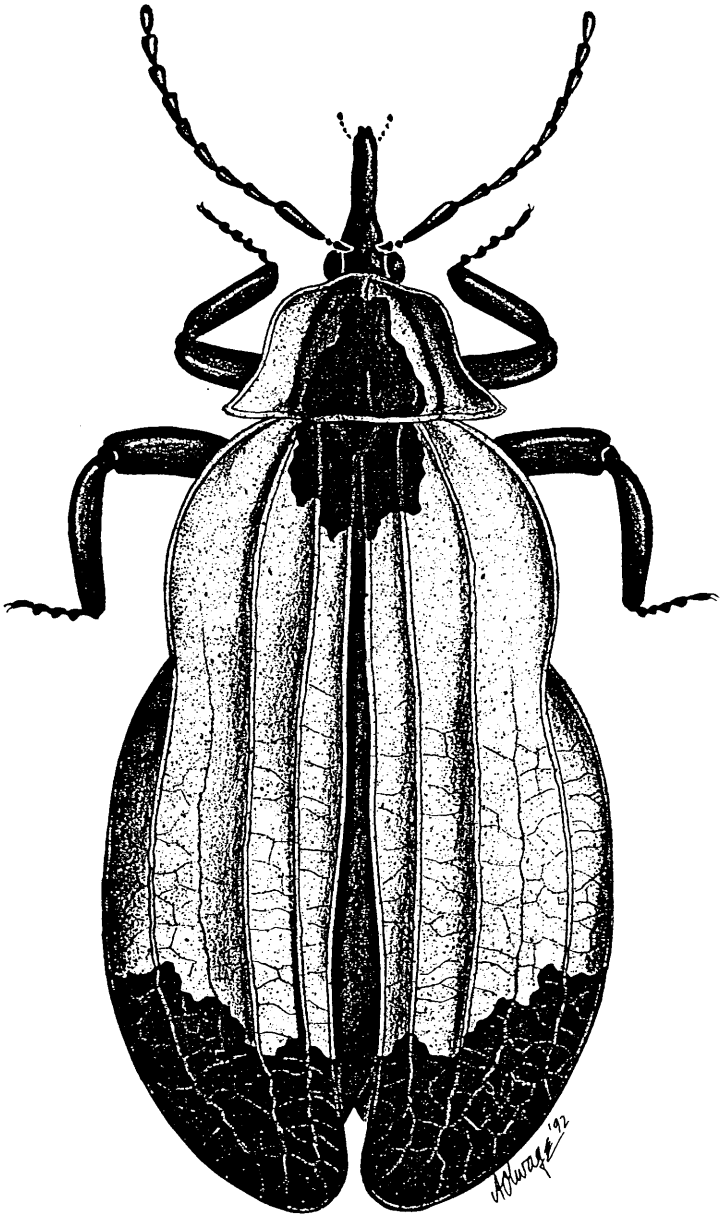


Figure 70: *Lycus (Merolycus) podagricus* Bourgeois.

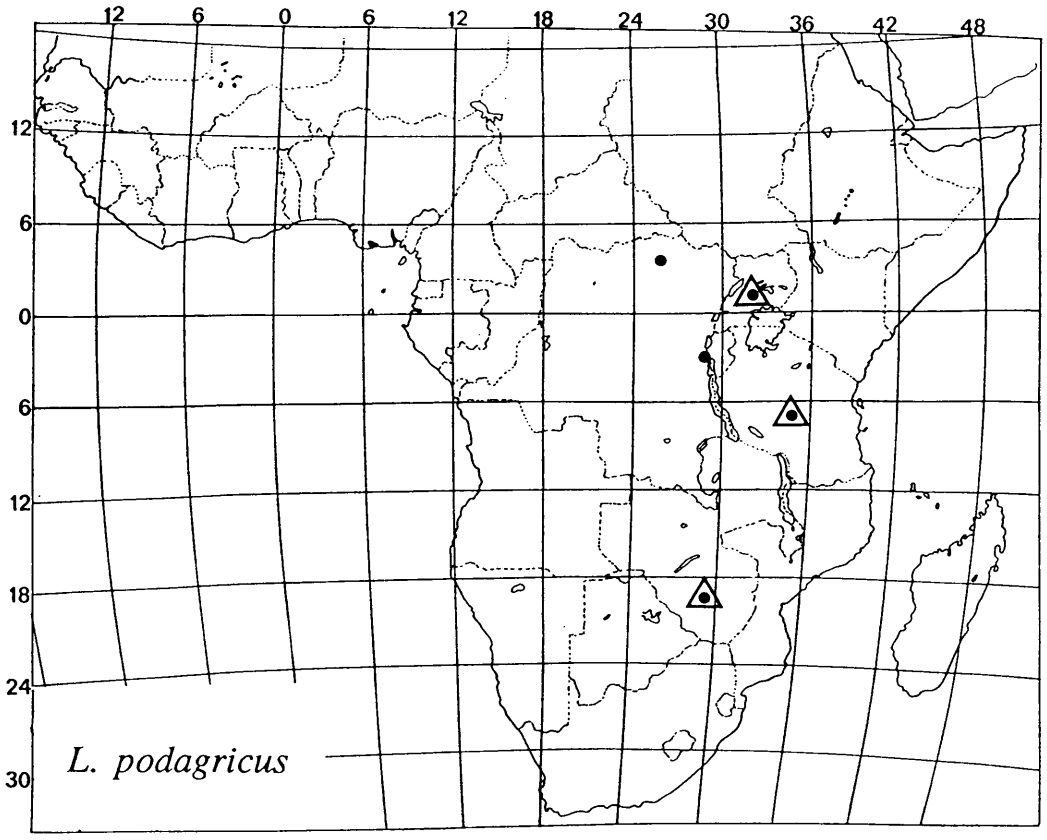


Figure 71: Distribution of *L. podagricus*.

Lycus (Merolycus) rostratellus Bourgeois

(Figs 72, 73 & 79D)

Lycus rostratellus Bourgeois, 1908b: 501; Kleine 1933: 13; Gomes-Alves 1967: 53.

obtusus Kleine, 1942: 151. **syn. nov.**

TYPES: No *L. rostratellus* type specimens traced.

L. obtusus Kleine 1 PT (male): Natal; Co-typus; Paratypus 643; ex coll. R. Kleine 12/45 det. *Merolycus obtusatus* Kleine (ZMPA).

Redescription

MALE

Size: length 9,0-20,0 mm; hum. width 5,0-6,0mm; width 6,0-9,0 mm.

Head: transversely depressed between eyes, forming two deep pits.

Rostrum: short and stout; 1,15-1,50X distance between eyes.

Antennae: 4-10 serrate; 3<4+5; 10<11.

Maxillary palpi: moderately broad, with last segment short, and depressed apically.

Colouration: head, antennae, legs (varying), mesal part of pronotum, mesal part of abdomen (varying from ochraceous with black markings to completely black), scutellar area, posterior 1/3-1/4 of elytra black; rest of pronotum and elytra ochraceous (Fig. 72).

Pronotum: broader than long, 1:1,45-1,55X; anterior angles obtusely rounded (semicircular-form), with anterior slightly ridged; posterior angles acutely rounded, posterior margin straight; sides reflexed.

Elytra: elongate, subparallel, slightly dilated from humeral areas posteriorly; costae 1, 2 and 4 distinct, 3rd indistinct; one row of fine reticulate cells between costae; sutural margin straight, maybe slightly concave mesally; extremities ovally rounded. (Fig. 72).

Abdomen: penultimate segment transverse, posterior margin arched mesally; last segment triangular.

Legs: middle- and hindlegs with femora and tibia thickened and toothed; forelegs simple.

Male genitalia: stout with apex broadly rounded, with a small, pointed ventral lobe; parameres closely fused and hardly visible (Fig. 79D).

FEMALE

Size; length 14,0-21,0 mm; width 6,0-6,5 mm

The form and colouration of elytra similar to male, legs simple.

Discussion

L. obtusus Kleine is synonymized with *L. rostratellus*. (*L. obtusatus* was wrongly quoted on the det. label of the paratype specimen, should be *L. obtusus*). The colouration, elytral form, aedeagus and distribution range is similar. According to the only literature available (Kleine 1942), *obtusus* occurs in Natal. (The det. label attached to the paratype of *obtusus* has mistakenly been spelt *obtusus*, *obtusatus*, but it is the original paratype).

Material examined

11 specimens examined.

BOTSWANA: Damara Pan (2 TMSA). NAMIBIA: 25 Km NW Wihelmstal (1 UPSA). SOUTH AFRICA: CP. Hexrivier (1 SANC). TVL. Broederspruit (5 SAMC); Pretoria (1 UPSA).

Geographical distribution (Fig. 73)

Botswana, Lesotho, Namibia, South Africa (Cape, Natal, Tvl).

Diagnosis

This species easily recognised by the thickened and toothed middle- and hindlegs, elongated form and colouration (black scutellar colouration very distinct) of the elytra, and form of the aedeagus.

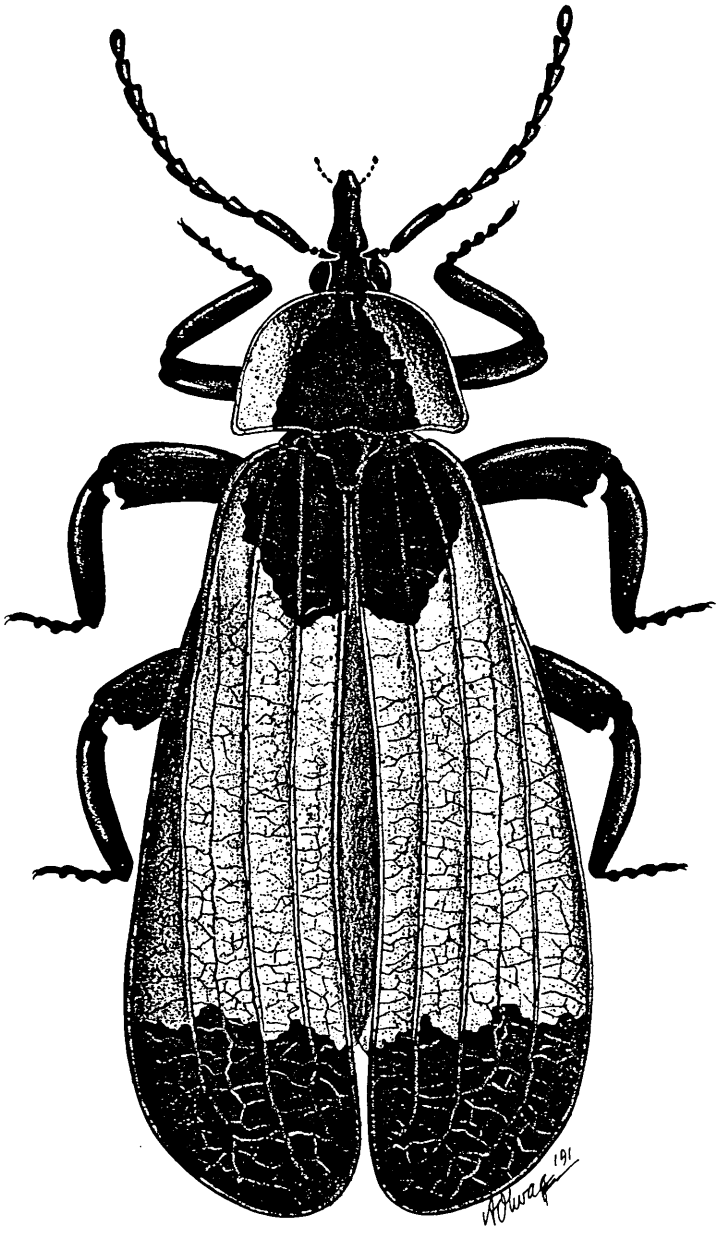


Figure 72: *Lycus (Merolycus) rostratellus* Bourgeois.

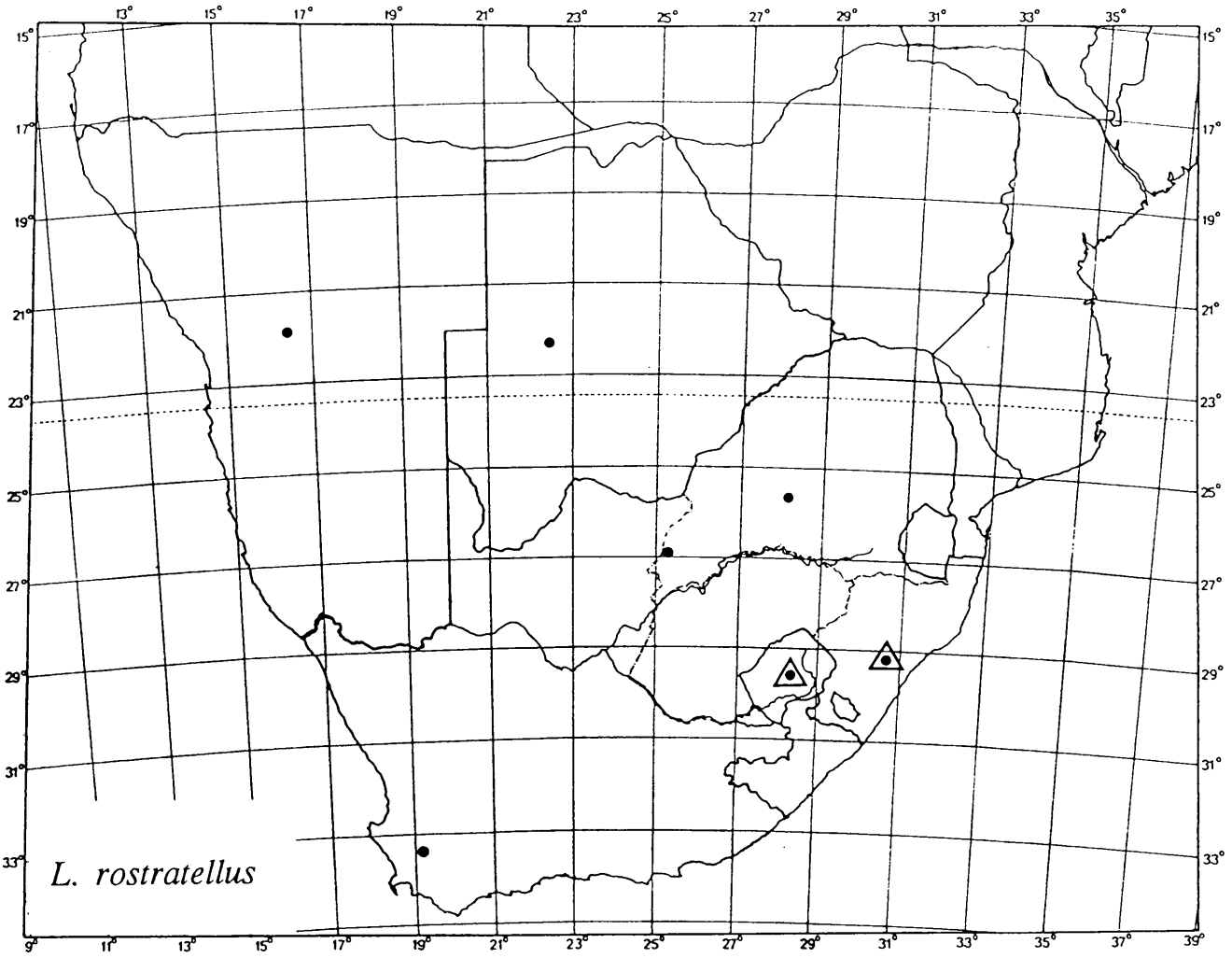


Figure 73: Distribution of *L. rostratellus*.

Lycus (Merolycus) rostratus (L.)

(Figs 74, 75, 76 & 79E)

Lampyris rostratus L., 1767: 646.

Lycus rostratus F.: 1787: 163; Roemer 1789: 47; Oliver 1790: 8; Bourgeois 1880a: 148; 1904: 92; Kleine 1933: 13; 1937: 96; Pic 1939: 31 (v. *henrioni*); Gomes-Alves 1962: 46.

pyriformis Murray, 1868: 328; Waterhouse 1879: 16; Kleine 1933: 10.

dentipes Dalman, 1817: 27; Murray 1868: 325; Bourgeois 1900: 145; 1902: 740 (v. *flavoscapularis*); Kleine 1933: 12; Gomes-Alves 1952: 13; 1959: 114; 1967: 52; Chown & Stamhuis 1992:173.

TYPES: *L. dentipes*: 1HT (male): Cap bon sp; 165/89 (NHRS).

(no Linnaeus or other types traced).

Redescription

MALE

Size: length 9,0-22,0 mm. hum. width 4,5-13,0 mm; width 9,0-21,0 mm.

Head: transversely depressed between eyes, forming two deep pits.

Rostrum: long and slender ,2,30-2,60X distance between the eyes.

Antennae: 5-10 serrate; 3<4+5; 10<11.

Maxillary palpi: slender, with last segment elongated and apically slightly depressed.

Colouration: head, antennae, legs, mesal part of pronotum (varying) and abdomen (last segment black); apex of elytra (varying) black; humeral and scutellar area black (varying); rest of elytra, abdomen and pronotum ochraceous (Figs 74 & 75).

Pronotum: broader than long, 1:1,52-1,70; anterior angles obtuse, anterior ridged, slightly protruding; posterior angles acutely rounded; sides reflexed.

Elytra: glabrous; subpyriform in outline; humeral crest varying greatly in size and shape (Fig. 74); posterior part of elytra dilated (circular in form); sutural margin straight; 4 visible costae, costae 1 and 2 prominent, 3rd indistinct; 4th visible and continuous with humeral margin; a indistinct reticulate network between costae (Fig. 74).

Abdomen: penultimate segment transverse, posterior margin arched mesally, sides slightly protruding posteriorly; last segment triangular.

Legs: meso- and metafemora thickened, armed with a strong subobtuse tooth; tibia more slender and toothed; forelegs simple.

Male genitalia: parameres elongated, closely associated with median lobe; median lobe short and broad and curved apically with slit ventrally (Fig. 79E).

FEMALE

Size: length 8,5-18,0 mm; width 5,0-9,0 mm

Elytra elongated with very slight humeral crests; coloration similar to the male.

Discussion

This is a common species (both in distribution and numbers) and very variable in elytral form and colouration (Fig. 74A-J). The larger specimens (with the larger humeral crest) is associated with the humid coastal regions and the smaller, darker coloured species associated with the arid regions of Namibia. *L. dentipes* Dalman has been synonymized with *L. rostratus* (L.). See Chown and Stamhuis (1992) for a complete discussion (Appendix).

Material examined

987 specimens examined.

BOTSWANA: 10 Km N Nata (1 UPSA); Nata (4 UPSA). MALAWI: Central Malawi 20 Km E Salima (1 UPSA); Mangochi, 10 km SW (1 TMSA); MOZAMBIQUE: Delagoa Bay (5 MNHN); Inhaca Isl PEA (2 TMSA); Inhambane (1 SAMC); Maputo "Lourenco Marques" (7 TMSA); Rikatla (13 MNHN; 2 SAMC). NAMIBIA: Abachaus (19 TMSA); Gautscha and Kubasche Kundveld (4 TMSA); Gobabis (1 SAMC); Gobabis Owingi 246 (7 SMWH); Ike 346 Outjo (2 SMWH); Kalidona (2 SMWH); Katima Mulilo (1 TMSA); Outjo (1 SAMC; 2 SMWH); Owingi Gobabis (3 SMWH); Richthofen 126 Windhoek (SMWH); Rietfontein (1 UPSA); Tsumeb Kungveld (2 TMSA); Windhoek (1 SAMC; 7 SMWH; 1 TMSA); Windhoek Excelsior 286 (1 SMWH); Windhoek Ricthofen 126 (1 SMWH). SOUTH AFRICA: CP. (1 ISNB; 1 MNHN; 1 TMSA); Adullam Farm nr Clarens (7 SANC); Algoa Bay (2 TMSA); Algoa Bay" Port Elizabeth (13 TMSA); Banhoek Valley, Stellenbosch (1 SAMC); Boschkloof Clanwilliam (1 SAMC); Cederberg Boshof (1 TMSA); Ceres (4 SAMC); Ceres, Upper Sources Olifants River (5 SAMC); Clanwilliam 39km E (1 UPSA); Dordrecht (1 SANC); East London (3 TMSA); Eersterivier (1 SAMC); Fort Beaufort (1 SANC); Grootvaderbos (1 TMSA); Heidelberg distr. (13 SAMC); Hexriver (2 SANC); Knysna (3 SAMC); Krabbefontein (2 TMSA); Pakhuys 134, Clanwilliam (1 BMSA); Port Elizabeth (1 BMNH; 2 SAMC); Port Natal (2 MNHN); Port St John (1 SAMC); Queenstown (1 MRAC); Queenstown (1 MRAC; 1 TMSA); Resolution Albany Distr. (1 TMSA) ; Riversdale (2 ISNB); Rust en Vrede Oudtshoorn Distr. (1 SAMC); Stella (1 TMSA); Stellenbosch (1 SAMC; 1 SANC; 3 TMSA); Tulbach (12 BMNH; 8 SAMC); Vryburg (16 SMWH; 1 UPSA); Wiedouw (5 BMSA; 2 SMWH; 1 UPSA); Willomore (2 SAMC; 2 TMSA); Zuurvlakte Wellington (1 SAMC); NAT. (2 SAMC); Dalton (2 SAMC; 1 SANC); Drakensberg Nat. Park (2 UPSA); Dumisa (1 MNHN); Durban (2 BMNH; 4 SAMC; 2 SANC; 1 TMSA); Empangeni (1 TMSA); Ingogo (2 BMNH); Kosi Bay (1 SANC); Kwazulu, 35Km N Jozini Ndumu Rd (1 SANC); Malvern (3 SAMC; 1 TMSA); Manzengwenya (1

Nyalazi Forest (1 TMSA); Pietermaritzburg (1 SANC; 10 TMSA); Royal Natal N.P. (1 TMSA); Sodwana Bay Nat. Res. (2 TMSA; 15 UPSA); Tongaat (2 TMSA); Umtentweni (1 SANC); Weenen (1 SANC); Zululand Ndumu Game Res. (2 TMSA); Zululand Uaputa (1 ISNB). OFS. Bloemfontein (9 BMSA); Bothaville (15 TMSA); Brandfort (1 SANC); Doornbult 1310 Hoopstad (1 BMSA); Drakensberg Bot Gard nr Harrismith (1 SANC); Florisbad 686 Brandfort (1 BMSA); Goedehoop Heidelberg Distr. (7 SAMC); Golden Gate (1 UPSA); Groenkloof 294 Ladybrand (29 BMSA); Harrismith Sw foot of Platberg (1 SANC); Harrismith, Witzieshoek (2 BMSA); Heilbron (1 SAMC); Kerkenberg Mt Harrismith (1 BMSA); Ladybrand Groenkloof 294 (3 BMSA); Ladybrand Nova 667 (5 BMSA); Ladysmith (1 SAMC); Loskop (8 TMSA); McCabespruit on Ladybrand-Clocolan Rd (1 BMSA); Parys (42 BMSA); Sandveld Nat. Res. Hoopstad (9 BMSA); Sophiasdal 280 Hoopstad (8 BMSA); Voorspoed 1585 Boshof (5 BMSA). TVL. (1 ISNB; 1 MNHN); Afguns 22 km S Ellisras (2 SANC); Agatha (101 UPSA); Allerton (1 BMNH); Bandolierskop (7 TMSA); Barberton (1 BMNH; 2 SANC; 2 TMSA); Bethal (1 BMSA); Blouberg (1 TMSA); Bobbejaansberg 16 km NE Roodeplaat dam (15 UPSA); Boekenhoutskloof (7 UPSA); Boksburg (1 BMSA; 1 UPSA); Bon Accord (4 UPSA); Brits (2 UPSA); Bronkhorstpruit (1 UPSA); Buysdorp (6 SANC); De Kuilen Lydenburg (2 SANC); De La Rey (3 TMSA); Delmas (1 UPSA); Die Bron 15 Km Groblersdal (9 UPSA); Doorndraai Dam Nat. Res. (4 SANC); Graskop (1 UPSA); Groot Letaba (2 TMSA); Hectorspruit (1 UPSA); Johannesburg (5 SANC; 4 TMSA); Kaapmuiden (1 TMSA; 1 UPSA); Kelvin, Johannesburg (3 SANC); Klaseri (3 UPSA); KNP Pretoriuskop (1 SANC); KNP Stolsnek (1 UPSA); Kroondal (2 TMSA); Kruger Park (1 ISNB); Langjan Nat. Res. (1 SANC); Loskopdam (3 SANC; 2 UPSA); Louis Trichardt (1 BMNH); Lydenberg (7 TMSA); Lydenburg 43 Km S on R36 (2 UPSA); Marikana (8 UPSA); Meyerton (1 UPSA); Middelburg (3 UPSA); Mogol Nat. Res., Elisras Distr. (2 SANC); Moloto (1 UPSA); Naboomspruit (2 UPSA); Naboomspruit Libertas Dist. (3 SANC); Nelspruit (1 SAMC; 1 UPSA); Nylstroom (2 TMSA; 1 UPSA); Nylsvlei Nat. (2 BMNH; 1 TMSA; 13 SANC; 2 UPSA); Penge Lydenburg distr. (1 TMSA); Pienaarspoort (1 UPSA); Pietersburg (1 SAMC; 4 UPSA); Potchefstroom (2 SAMC; 1 SANC; 1 TMSA); Potgietrsrus (1 SMWH); Pretoria (8 BMNH; 2 SAMC; 11 SANC; 8 TMSA; 28 UPSA); Pretoria North (1 TMSA; 72 UPSA); Pretoriuskop (1 UPSA); Punda Milia (2 TMSA); Renosterpoort, Bronkhorstpruit Dist. (7 TMSA); Roodeplaat (2 SANC); Rust de Winter (1 UPSA); Rustenburg Nat. Res. (1 SANC); Saartjiesnek (2 TMSA; 42 UPSA); Skukuza (1 SANC; 1 UPSA); Soutpan (1 TMSA; 1 UPSA); Soutpansberg (1 TMSA); Standerton, Platrand (1 SANC); Tawoomba Warmbad (1 SANC); Thabazimbi (1 UPSA); Tsokwane KNW 8 Myle Leeupan (1 SANC); Tzaneen (1 UPSA); Vaalwater (3 UPSA); Vereeniging (1 UPSA); Volksrust (1 UPSA); Wakkerstroom (1 UPSA); Waterberg Farm 223 (16 TMSA); Waterval Onder (1 BMNH); Wolkberg nr Haenertsburg (2 TMSA); Wonderboom (2 TMSA); Zebediela (2 TMSA); Zeerust (1 TMSA). TRANSKEI: Umzinkulu (1 UPSA); Wilovale 12 km SE (1 TMSA). ZAMBIA: Morokevong (2 SANC); Shilouvane pres Leydsdorp (2 MNHN). ZIMBABWE: (1 BMNH); Bulawayo (2 TMSA); Fort Victoria (1 TMSA); Harare

"Salisbury" (1 TMSA); Helenvale (1 BMNH); Inyamaziwa, Inyanga (1 TMSA); Kashitu N of Broken Hill (6 BMNH); Mwengwa (2 BMNH); Salisbury (1 SANC; 1 TMSA); Sebakwe (2 SAMC); Umtali (4 SAMC). "Minastune" (4 TMSA). Without locality (2 MNHN)

Geographical distribution (Fig. 76)

Angola, Botswana, Ethiopia, Mozambique, Namibia, Nigeria, South Africa (Cape, O.F.S, Natal, Tvl.), Transkei, Zaire, Zambia and Zimbabwe.

Diagnosis

This species can be recognized by the lateral dilated elytra, humeral crest and form of the aedeagus.

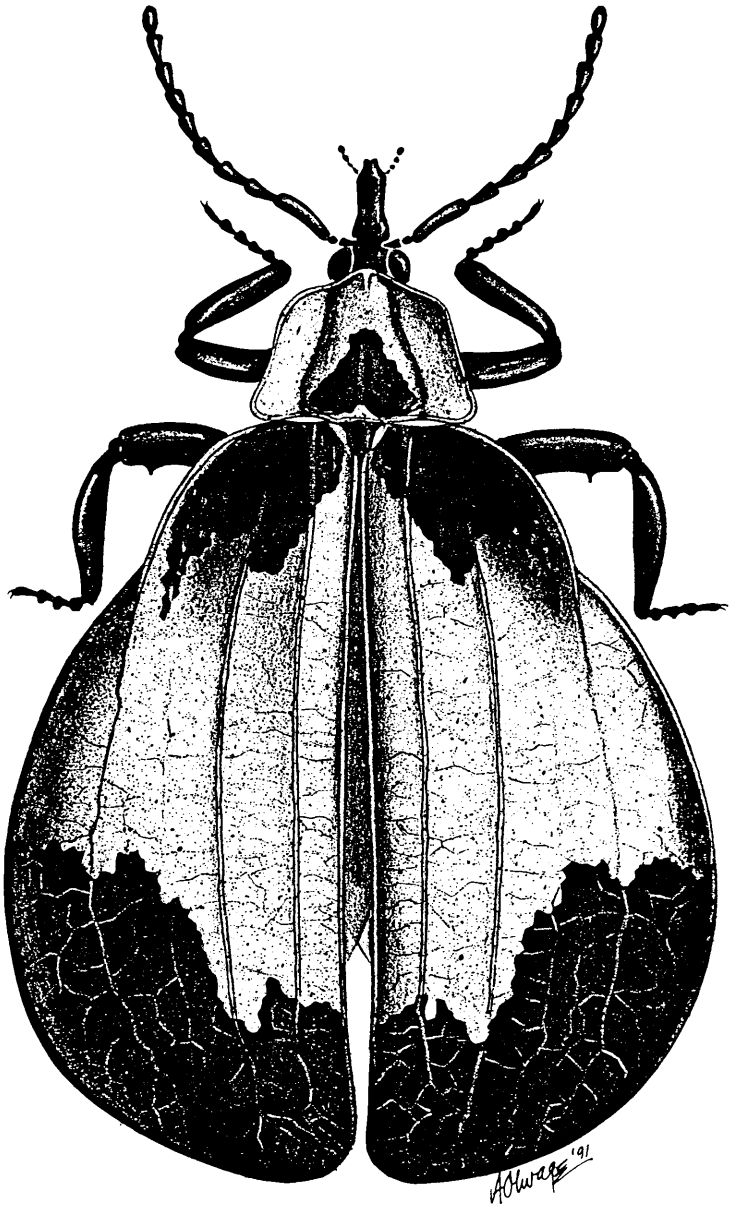


Figure 74: *Lycus (Merolycus) rostratus* (L.).

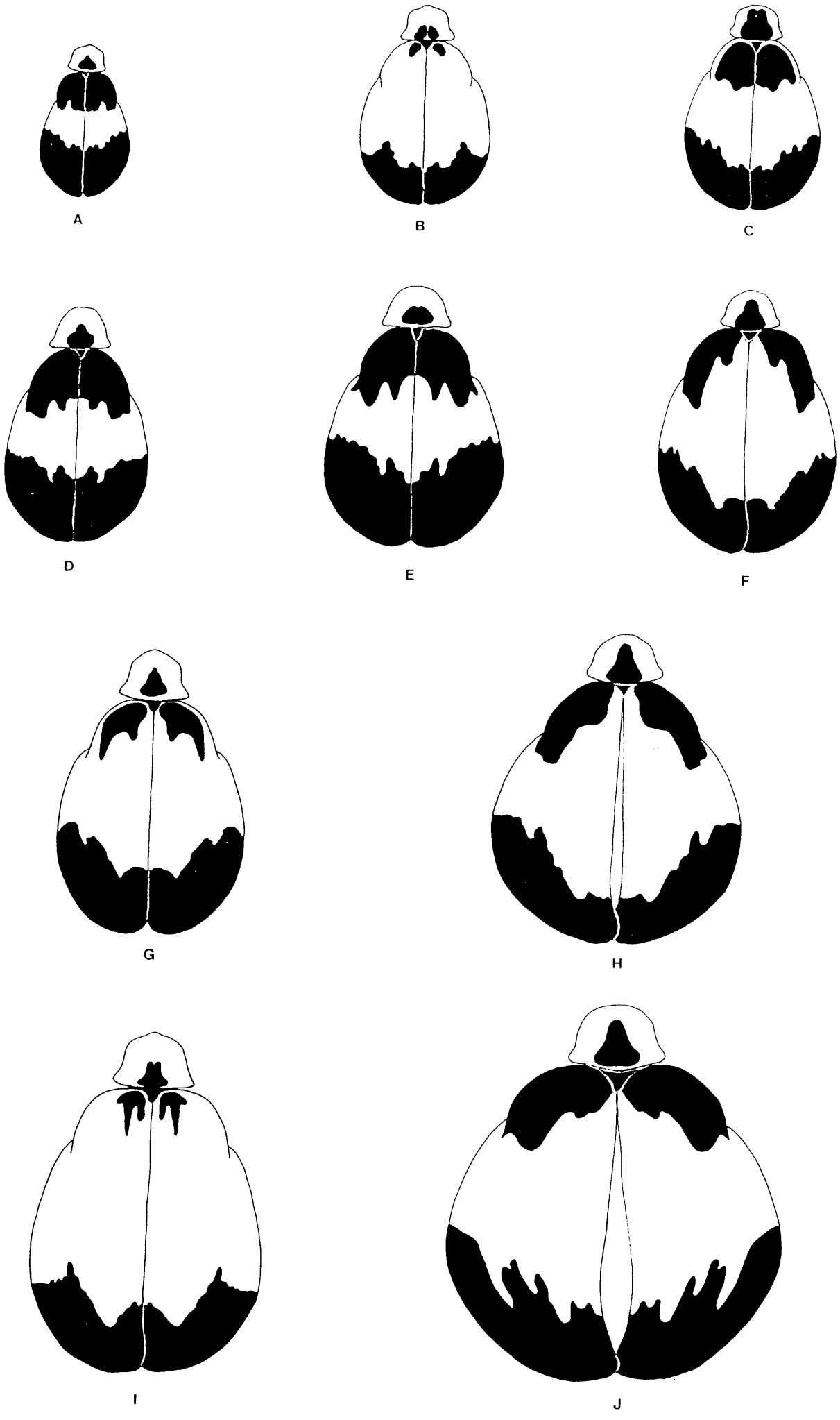
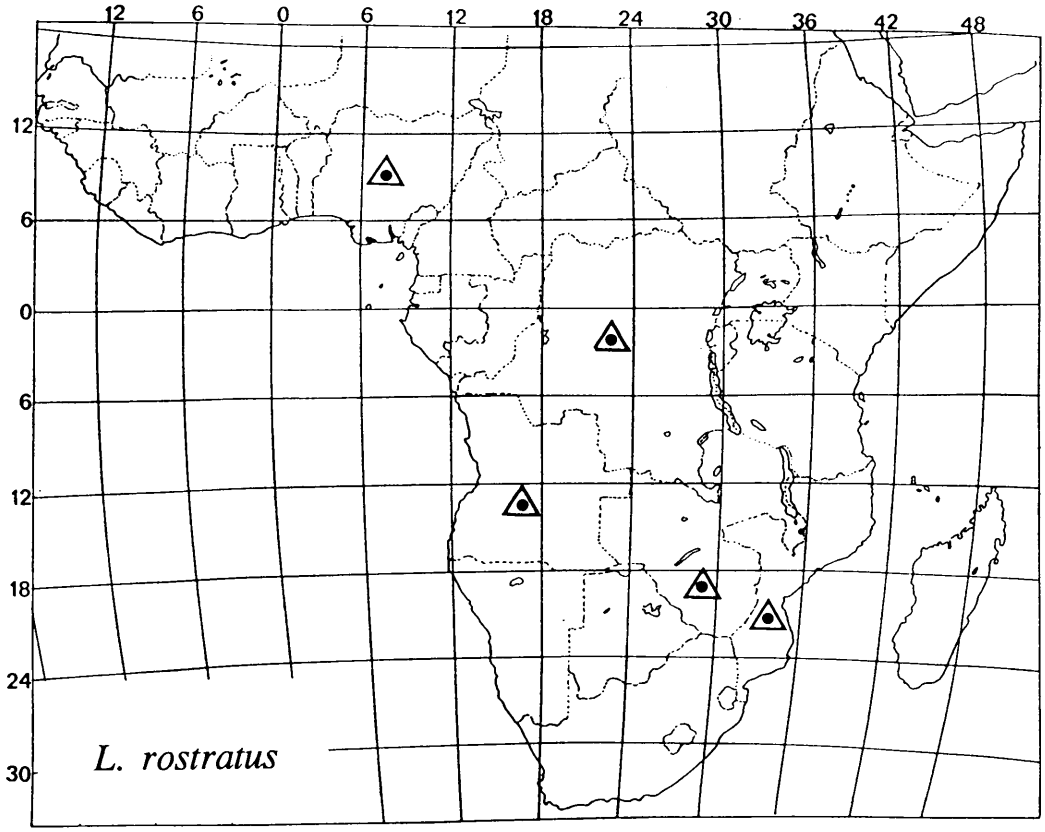


Figure 75A - J: Colour variation in *L. rostratus*. - **C** *L. rostratus* (All the rest are *L. dentipes* from different areas - See Chown & Stamhuis (1992)).



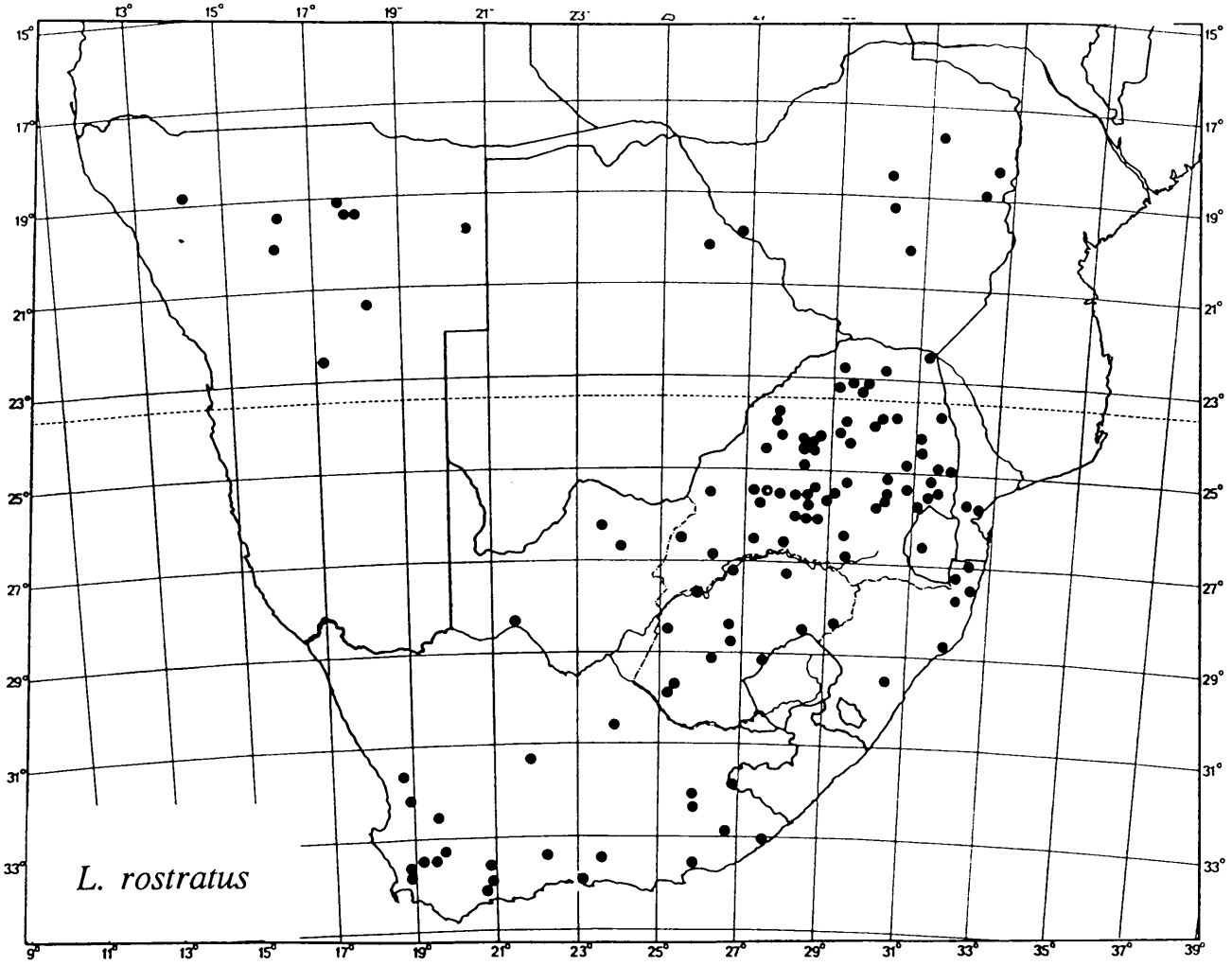


Figure 76: Distribution of *L. rostratus*.

Lycus (Merolycus) scapularis Murray

(Figs 77, 78 & 79F)

Lycus scapularis Murray, 1868: 327; Waterhouse 1879: 17; Bourgeois 1900: 145; 1908c: 110; Kleine 1933: 13.

TYPE: No type specimens traced.

Redescription

MALE

Size: length 11,5-16,0 mm hum. width 5-6,5,0 mm; width 6,0-8,0 mm.

Head: transversely depressed between eyes, forming two deep pits.

Rostrum: short and broad, 1,60-1,70X distance between eyes.

Antennae: 5-10 serrate; 3<4+5; 10<11 (11 elongated).

Maxillary palpi: slender, with last segment broadly depressed apically.

Colouration: head, antennae, scutellar area (varying), mesal part of pronotum and abdomen (varying), legs (varying) and posterior 1/5 of elytra (margin concave mesally) black; rest of pronotum, abdomen and elytra ochraceous (Fig. 77).

Pronotum: transverse, 1:1,45-1,55X; anterior angles greatly obtuse, anterior slightly ridged; posterior angles acutely rounded; sides reflexed.

Elytra: elongated; anterior 1/3 of elytra sides slightly dilated (roundly-elongated form); posterior 2/3 elongated and hardly dilated; ovally rounded extremities, sutural margin straight; costae 1, 2 and 4 distinct, 3rd obsolete; indistinct, irregular reticulate network between costae (Fig. 77).

Abdomen: penultimate segment transverse, posterior margin arched, slightly indented mesally; last segment ovally-triangular in form.

Legs: hind- and middlefemora thickened and toothed, tibia slender and dentate; forelegs simple.

Male genitalia: parameres small and distinct; median lobe long, broad, apically curved back ventrally, ending in small, elongated lobe (Fig. 79F).

FEMALE

No specimens examined.

Discussion

A very rare species, with only eight specimens examined. Very similar to *podagricus* Bourgeois (see previous discussion). No other species found with similar aedeagus.

Material examined

8 specimens examined.

SOUTH AFRICA: NAT. Malvern (1 SAMC); TVL. Linwood, Pretoria (1 UPSA); Soutpansberg (1 SAMC). ZAIRE: Albertville (1 ISNB); Azande, Niam Niam (1 ISNB). Rutshuru (2 ISNB).

No locality (1 SAMC)

Geographical distribution (Fig. 78)

Nigeria (Old Calabar), Senegal, South Africa (Natal and Tvl), Tanzania and Zaire.

Diagnosis

Easily recognized by the form of the aedeagus, thickened hind- and middlelegs as well as the elongated elytral form.

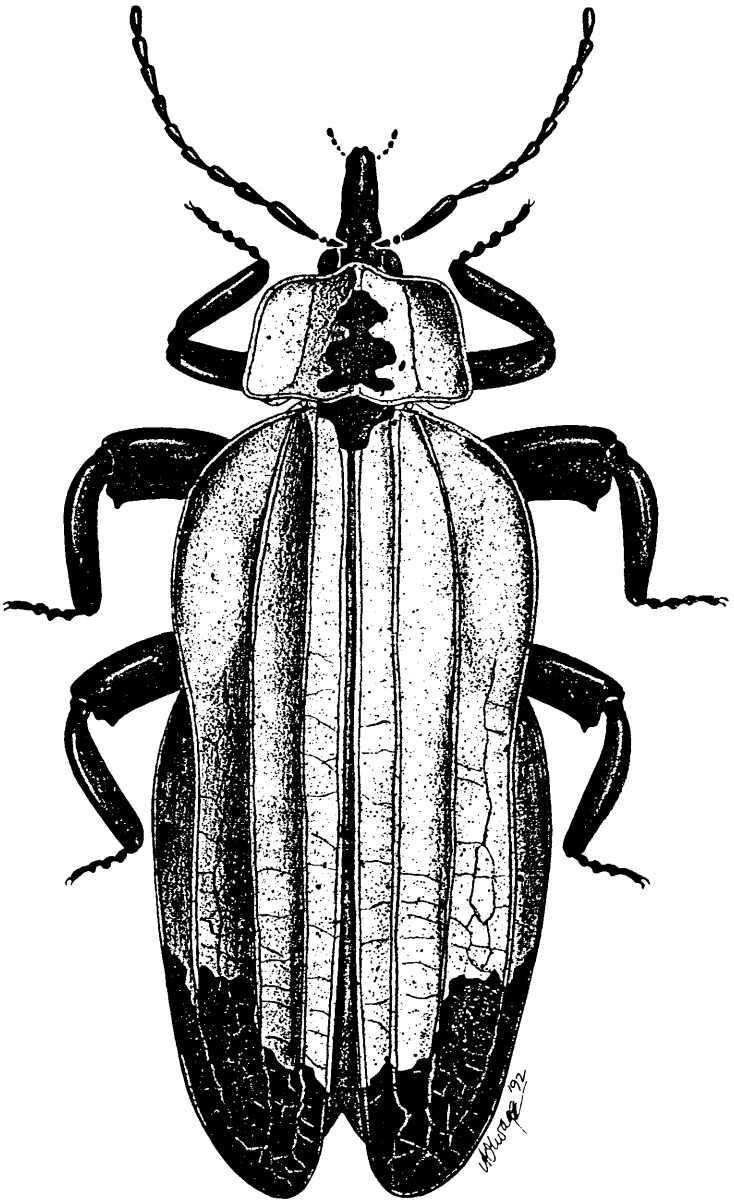


Figure 77: *L. scapularis* Murray.

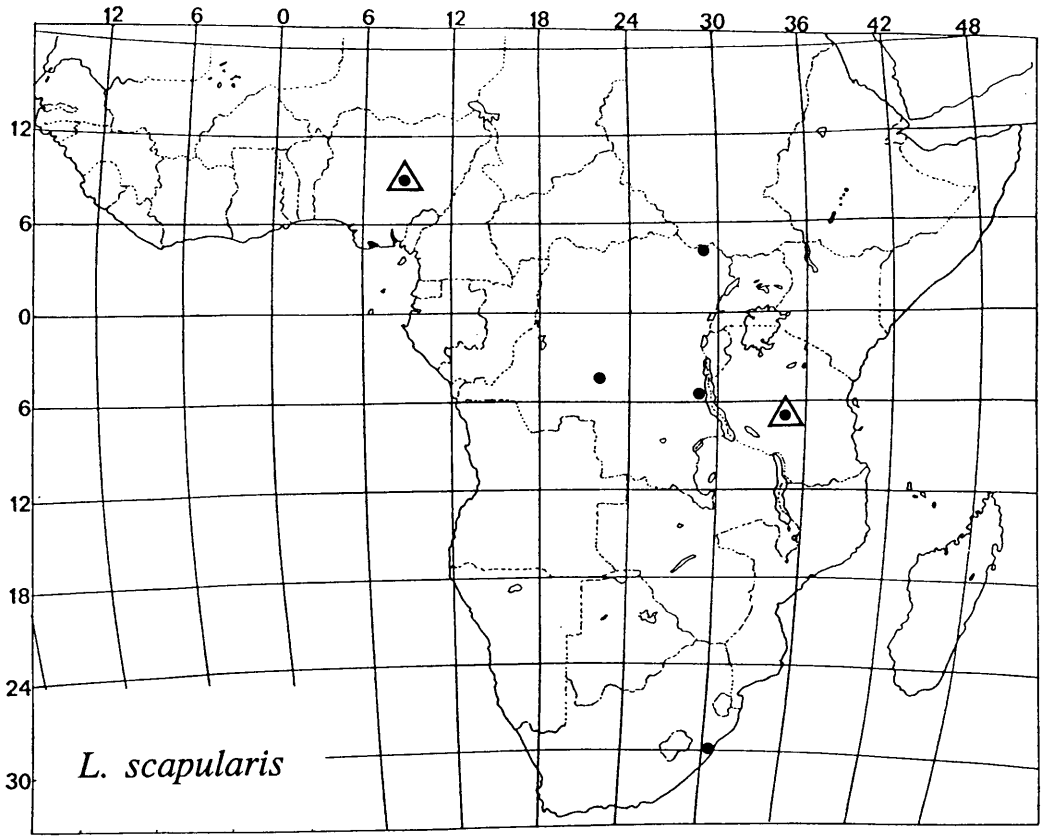


Figure 78: Distribution of *L. scapularis*.

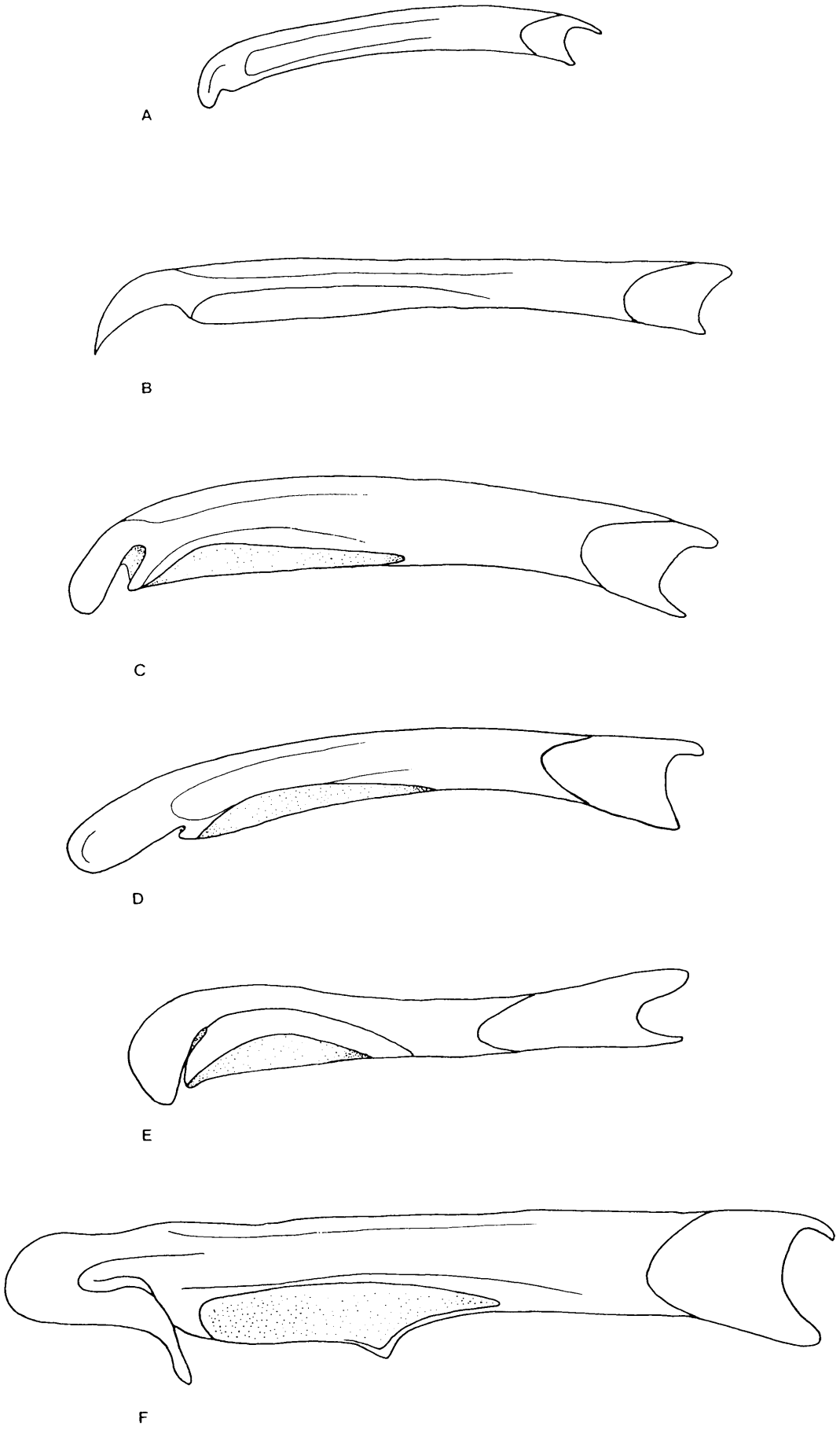


Figure 79A - F: Male genitalia. - **A** *L. chirindanus*. - **B** *L. humerosus*. - **C** *L. podagricus*. - **D** *L. rostratellus*. - **E** *L. rostratus*. - **F** *L. scapularis*.

INCERTAE SEDIS

1. *Acantholycus prometheus* Pic 1901

2. *Hololycus natalensis* Pic 1933

3. *Lopholycus amaenus* Bourgeois 1902

4. *Lopholycus cinctiventris* Pic 1938

5. *Lopholycus gorhami* Pic 1933

6. *Lycus marshalli* Bourgeois 1902

7. *Chlamydolycus burchelli* Pic 1904

8. *Lycus oviformis* Kleine 1939

9. *Merolycus transvaalensis* Pic 1933

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APPENDIX I ACRONYMS

1Ax	first axillary
2Ax	second axillary
3Ax	third axillary
A.fr	apical fringe
Aes	anepisternum
An.de.m	antennal depressor muscles
An.le.m	antennal levator muscles
An.pe	antennal pedicel
An.s	antennal socket
An.sc	antennal scapes
An	antennae
Ant.md.ar	anterior mandibular articulation
Ant.no.w.p	anterior notal wing process
Ant.t.arm	anterior tentorial arm
Ant.t.p	anterior tentorial pits
Ap	apodemes
Apl.su	anapleural suture
Ax.c	axillary cord
Ba.pc	basal piece
Bs	basisternum
C	coxa
Cd	cardo
Cib.dl	cibarial dilators
Cib	cibarium
Cl	claw
Cly.ge.su	clypeogenal suture
Cly.lbr.su	clypeolabral suture
Cly	clypeus
Co	costa
Cx	coxite
D.t.a	dorsal tentorial arm

Dc	deutocerebrum
E	eye
El	elytra
Eph	epipharynx
Epl	epipleura
F.ca	feeding canal
Fe.id	femoral indentation
Fe.sp	femoral spine
Fe	femur
Fr.b	frontal bulge
Fr.cly.su	frontoclypeal suture
Fr.co	frontal connectives
Fr.dep	frontal depression
Fr.gan	frontal ganglion
Fr.ge.su	frontogenal suture
Fr.p	frontal pit
Fr	frons
Ge	gena
Gl	galea
Gu	gula
H.ca	humeral callus
H.cr	humeral crest
H.sp	humeral spine
Hph	hypopharynx
Hps	hypostoma
Hw	hindwing
L.c.sl	lateral cervical sclerite
L.st	laterostipes (palpifer)
Lab.p	labial palp
Lbr	labrum
Lc	lacinia
Lig	ligula
M.c.su	midcranial suture
Md	mandible
Me.g	median groove
Me.l	median lobe

Me.lo.g	median longitudinal groove
Mg	median groove
Mo.l	molar lobe
Msc	mesocoxa
Msem	mesepimeron
Mses	mesepisternum
Msno	mesonotum
Mtc	metacoxa
Mtem	metepimeron
Mtes	metepisternum
Mt	mentum
Mtno	metanotum
Mx.a	maxillary articulation
Mx.p	maxillary palp
Mx	maxilla
No	notum
Oc.fo	occipital foramen
Oes	oesophagus
P.al.a	post alar arm
P.md.a	posterior mandibular articulation
P.no.w.p	posterior notal wing process
P.oc.rd	postoccipital ridge
P.oc.ri	postoccipital rim
P.oc.su	postoccipital suture
P.t.a	posterior tentorial arm
P.t.p	posterior tentorial pit
Pa	paramere
Pc	protocerebrum
Pg	postgena
Ph.dl	pharyngeal dilators
Ph	pharynx
Pl.su	pleuralsuture
Plst.su	pleurosternal suture
Plst	pleurostoma
Plw.pr	pleuralwing process
Pomt	postmentum

Pono	postnotum
Pr.al.a	pre-alar arm
Pr.ssc.su	prescutal suture
PRA	anal proxalare
PRCC	precosto-costal proxalare
PRCu	cubital proxalare
Prep	pre-episternum
PRJ	jugal proxalare
Prmt	prementum
Prno	pronotum
Proc	proctiger
PRR	radial proxalare
Prsc	prescutum
PRSc	subcostal proxalare
Py	pygidium
R.ce	reticulate cell
R.net	reticulate network
Ros	rostrum
S.sc.su	scutoscutellar suture
S.spo	sutural spine
Sal.tu	salivary tubes
Sal	salivarium
Sc	scutum
Sct	scutellum
Sge	subgena (pleurostoma)
Smt.pg.in	submentopostgenal inflection
Smt	submentum
Sp	spiracle
Ste	sternite
St	stipes
Sty	styli
Su.mar	sutural margin
T.br	tentorial bridge
Ta	tarsus
Tc.l	tritocerebral lobe
Te	tergite

Ti.id	tibial indentation
Ti.sp	tibial spine
Ti	tibia
Trc	trochantien
Trg	troganter
Va	valvifer
Ve	veins

APPENDIX II GLOSSARY

aculeate, aculeatus - pointed, armed with short, sharp points.

acuminate, acuminated, acuminatus - tapering to a long point.

acute - pointed; terminating in or forming less than a right angle.

alate, alatus - winged.

ampliate, ampliatus - moderately dilated.

angulate - forming an angle; when two margins or lines meet in an angle.

arcuate, arcuatus - arched; bow-like.

bloatation - inflation, swellin, puffed up.

carina - an elevated ridge or keel, not necessarily high or acute.

carinate, carinatus - keeled; having keels or carinae; with a, or several, longitudinal narrow raised lines.

concave - hollowed out.

congener - a species belonging to the same genus as another.

constricted, constrictus - drawn in; narrowed medially and dilated towards the extremities.

contiguous - so near together as to touch.

continuous variation - an individual variation.

cordate, cordatus, cordiform - heart-shaped; triangular, with the corners of the base rounded.

costate - furnished with costae or longitudinal raised ribs.

curvate - curved.

cuspidate, cuspidatus - prickly pointed; ending in a sharp point.

deflexed - abruptly bent downwards.

dentate, dentatus - toothed; with tooth-like prominences.

depressed - flattened down as if pressed.

dilated - widened, expanded.

elevate, elevated, elevatus - of a part, higher than its surroundings.

emarginate, emarginatus - notched; with an obtuse, rounded or quadrate section cut from a margin.

emargination - a cut-out place in an edge or margin.

epipleura - the deflexed or inflexed portions of the elytra, immediately beneath the edge; entire bent-under margin of the elytra.

excavatus - with a depression that is not a segment of a circle.

explanate - spread out and flattened; applied to a margin.

fenestratus - with transparent or window-like naked spots.

foliaceous - leaf-like.

furcate -fork-shaped.

fusiform - spindle-shaped, broad at middle and narrowing towards the end.

glabrous - smooth, hairless and without punctures or structures.

hamatus - furnished with hooks, or bent like a hook.

harpargo - claspers.

humeral carina - an elevated ridge or keel on the outer anterior angle of elytra.

humeral crest -shoulder-like extended (widened) process.

humeral callus - a swollen or raised area on the shoulder.

immersus - inserted, imbedded or hidden in.

incertae sedis - of uncertain position.

inermis - unarmed; without straie, spines or any other sharp process.

inflection - bent inward at an angle.

integer - entire; without incisions, as a margin.

lingulate - tongue-shaped.

luteous - clay-coloured; brownish-yellow; deep yellow with a tint of red.

obconic, obconical - in the form of a reversed cone.

obcordate, obcordiform - inversely heart-shaped; with the point applied to the base of another object or part.

obliterate - nearly rubbed out; indistinct.

oblong - longer than broad; with the longitudinal diameter more than twice the transverse.

obsolete - almost or entirely absent; indistinct.

obtuse - not pointed; at an angle greater than a right angle; opposed to acute.

ochraceous - yellow with a slight tinge of brown.

paraprocts - one of the two lobes formed by the ventrolateral parts of the epiproct.

pubescence - short, fine, soft, erect hair.

punctate - set with impressed points or punctures.

pyriform - pear-shaped.

reflexed -bent up or back.

reticulate cells - covered with a net-work of lines; meshed; netted.

robust - stout or thickened.

rostrate, rostratus - having a rostrum, a long protraction bearing the mouthparts.

rugose - wrinkled.

scutate - shield-shaped.

serrate - saw-like; with notched edges like the teeth of a saw.

setae - short hairs.

sinuate - cut into sinuses; wavy; especially, of edges or margins.

spiniform - in the form or shape of a spine.

spined, spinose - armed with spines; spiny.

subcordate - somewhat resembling the shape of a heart.

subquadrate - not quite a square.

transverse - broader than long; running across.

trapezoidal - in the form of a four-sided figure of which two sides are parallel and two are not.

trilobite - having three lobes.

truncate - cut off squarely at tip.

valvifers - the basal plates of the ovipositor.

APPENDIX III TAXONOMIC LIST OF AFROTROPICAL *LYCUS* SPECIES

abomeyensis Pic 1952 (Haplolycus)

abyssinicus Pic 1940 (Haplolycus)

aculeatus Bourgeois 1880 (Lycus)

acutipennis Pic 1939 (Haplolycus)

aeolus Murray 1868 (Acantholycus - melanurus)

agrestis Bourgeois 1902 (Haplolycus)

alatus Kleine 1935 (Lycus)

alberti Pic 1931 (Lycus)

albifrons Kleine 1937 (Merolycus)

alluandi Bourgeois 1889 (Acantholycus)

altecostatus Pic 1933 (Lycus)

amaenus Bourgeois 1902 (Lopholycus)

ampliatus Fåhraeus 1851 (Lycus)

angulicollis Pic 1937 (Merolycus)

angustemarginatus Pic 1955 (Lycus)

angusticollis Pic 1933 (Haplolycus)

angustisuturalis Kleine 1939 (Haplolycus)

antespinosus Pic 1930 (Lycus)

apicalis Thomson 1858 (Acantholycus)

apicefasciatus Pic 1927 (Lycus)

apiceprolongatus Pic 1955 (Lycus)

appendiculatus Sturm 1843 (Chlamydolycus - trabeatus)

arcuatetruncatus Pic 1952 (Acantholycus)

aspidatus Murray 1868 (Lycus)

atrocinctus Pic 1951 (Haplolycus)

atroconjunctus Pic 1933 (Lopholycus)

atromarginatus Kleine 1939 (Lopholycus)*

atromarginatus Pic ? (Merolycus)*

attenuatus Pic ? (Haplolycus)

basicornis Pic 1931 (Lycus)

basilewskyi Pic 1955 (Lycus)

basistriatus Kleine 1940 (Merolycus)

bellicosus Bourgeois 1880 (Lycus)

bicarinicollis Pic 1955 (Lopholycus)

biflexuosus Pic 1935 (Lycus)

bilunulatus Pic ? (Haplolycus)

bimaculatithorax Pic 1933 (Lopholycus)

bingeri Pic 1933 (Lopholycus)

bocandei Bourgeois 1884 (Haplolycus)

bourgeoisi Fairmaire 1884 (Hololycus)

bouvieri Bourgeois 1901 (Merolycus)

bozasi Bourgeois 1906 (Lopholycus)

bracteatus Kleine 1937 (Lycus)

bredoi Kleine 1937 (Lycus)

bremei Murray 1868 (Haplolycus)

breveapicalis Pic ? (Lopholycus)

brevenotatus Pic 1925 (Lopholycus)

burchelli Bourgeois 1904 (Chlamydolycus)

carpenteri Pic 1935 (Acantholycus)

chariensis Pic 1933 (Haplolycus)

chirindanus Kleine 1939 (Merolycus)

cinctiventris Pic 1938 (Lopholycus)

circummarginatus Kleine 1942 (Lopholycus)

clarus Kleine 1940 (Acantholycus)

collarti Pic 1932 (Acantholycus)

conformis Bourgeois 1902 (Haplolycus - agrestis)

congener Gerstaecker 1871 (Haplolycus - agrestis)

congoanus Pic 1933 (Merolycus)

conradsi Kleine 1939 (Haplolycus)

conradti Pic 1933 (Merolycus)

consobrinus Bourgeois 1882 (Lopholycus)

constrictus Fåhraeus 1851 (Acantholycus - melanurus)

corniger Dalman 1817 (Acantholycus)

cornipennis Bourgeois 1899 (Lycus)

corporaali Pic 1942(Haplolycus)

crampeli Pic 1933 (Lycus)

cristatus Fabricius 1801 (Lycus)

curticornis Bourgeois ? (Lycus)

curtirostris Bourgeois 1906 (Hololycus)

curtus Pic 1933 (Lopholycus)

curvatispinus Pic 1923 (Acantholycus)

cuspidatus Klug 1855 (Acantholycus - constrictus)

dalmani Bourgeois 1889 (Haplolycus)

dekeyseri Pic 1953 (Lopholycus)

delamarei Pic 1946 (Haplolycus)

dentipes Dalman 1817 (Merolycus - rostratus)

deplanatus Pic 1921 (Lycus)

descarpentriesie Marie 1968 (Lycus)

diaphanus Kleine 1933 (Lycus)

diffusus Kleine 1939 (Haplolycus)

dilatatus Kleine 1936 (Merolycus)

dissimilis Bertoloni 1849 (Haplolycus)

distanti Bourgeois 1892 (Chlamydolycus)

diversicolor Kleine 1940 (Lopholycus)

diversicostis Pic 1933 (Lopohloycus)

diversipennis Pic 1933 (Merolycus)

diversithorax Kleine 1940 (Lopholycus)

dominus Kleine 1939 (lopholycus)

duvivieri Bourgeois 1900 (Lycus)

edwardsi Kleine 1940 (Merolycus)

elegans Murray 1868 (Acantholycus - latissimus)

elevatecostatus Pic 1958 (Haplolycus)

elevatus Guérin-Méneville 1847 (Lycus)

elongatipennis Pic 1935 (Lycus)

ensellatus Pic 1926/ 1933? (Lycus)

erythreus Pic 1933 (Merolycus)

excavatus Pic 1921 (Lycus)

excisellus Bourgeois 1889 (Hololycus)

fabricii Guérin-Méneville 1847 (Lycus)

fastiditus Bourgeois 1885 (Haplolycus - scrobicollis)

fehsei Kleine 1937 (Lycus)

flammeatus Bourgeois 1908 (Lycus)

foliaceus Dalman 1817 (Lycus)

fortecostatus Pic 1939 (Lycus)

fradei Gomez-Alves 1961 (Lopholycus)

furcatus Pic 1948 (Lycus)

gabonicus Kleine 1939 (Haplolycus)

gibbulifer Bourgeois 1908 (Merolycus)

gorhami Pic 1933 (Lopholycus)

grandicollis Pic 1942 (Merolycus)

grandjeani Pic 1933 (Merolycus)

granulosus Kleine 1939 (Haplolycus)*

granulosus Kleine ? (Lycus)*

gravidulus Gerstaeker 1871 (Lycus)

haagi Bourgeois 1878 (Lopholycus)

hamatus Guérin-Méneville 1847 (Lycus)

hamulifer Bourgeois 1908 (Lycus)

harpargo Thomson 1858 (Acantholycus - latissimus)

hintzi Pic 1930 (Acantholycus)

horridus Kleine 1937 (Merolycus)

hulstaert Pic 1933 (Lopholycus)

humerospinosus Pic 1921 (Acantholycus)*

humerospinosus Pic 1921 (Lophollycus)*

humerosus Fåhraeus 1851 (Merolycus)

imbellis Bourgeois 1908 (Haplolycus)

immersus Murray 1868 (Lycus)

inamplexus Bourgeois 1906 (Lopholycus)*

inamplexus Bourgeois 1908 (Lycus)*

inapicalis Pic 1925 (Haplolycus)

incisesuturalis Pic 1955 (Merolycus)

incisicollis Pic 1938 (Haplolycus)

inermis Harold 1879 (Merolycus)

inhumeralis Pic 1958 (Chlamydolycus)

inornatus Bourgeois 1901 (Lycus)

inscapularis Pic 1933 (Lopholycus)

integer Bourgeois 1900 (Acantholycus)

integripennis Bourgeois 1889 (Lopholycus)

intermedius Bourgeois 1884 (Hololycus)

interruptus Pic ? (Lycus)

inusitatus Kleine 1943 (Merolycus)

ivoirensis Pic 1936 (Haplolycus)

jeaneli Pic 1925 (Lopholycus)

jokoensis Pic 1921 (Lycus)

kapanganus Pic ? (Haplolycus)

katanganus Pic 1940 (Merolycus)

kerandeli Bourgeois 1909 (Lycus)

kleinei Pic 1933 (Merolycus)

kolbei Bourgeois 1889 (Lycus)

lamottei Pic 1958 (Lopholycus)

lateniger Pic 1938 (Lycus)

lateritus Thomson 1858 (Acantholycus - latissimus)

latesuturalis Pic 1921 (Acantholycus)

laticollis Kleine 1939 (Lopholycus)

latipennis Pic 1933 (Merolycus)

latissimus (L.) 1767 (Acantholycus)

laurenti Pic 1940 (Haplolycus)

lavali Pic 1940 (Lopholycus)

lefèvrei Kleine 1937 (Lopholycus)

leonensis Pic 1933 (Haplolycus)

lepesmei Pic 1953 (Haplolycus)

lesnei Bourgeois 1901 (Lopholycus)

letestui Pic 1933 (Merolycus)

leveillei Bourg. 1877 (Acantholycus -latissimus)

linnei (Bourgeois) Pic ? (Lycus- ampliatus)

longicornis Pic 1933 (Lopholycus)

longipennis Pic 1933 (Lopholycus)

longipes Pic 1935 (Haplolycus)

longirostris Pic 1935 (Lopholycus)

longispinus Pic 1923 (Acantholycus)

luluanus Pic 1937 (Merolycus)

luteolineatus Pic 1933 (Merolycus)

maderi Kleine 1939 (Lopholycus)

maesi Pic 1933 (Lopholycus)

marginaledentatus Pic 1955 (Lycus)

marshalli Bourgeois 1907 (Lycus)

maublanci Pic 1933 (Lycus)

maynéi Pic 1933 (Lopholycus)

medioincisus Pic 1955 (Lycus)

melanurus Dalman 1817 (Acantholycus)

minimus Kleine 1939 (Lycus)

minutus Pic 1933 (Lycus)

miokoensis Pic 1953 (Acantholycus)

moderatus Kleine 1939 (Haplolycus)

modestus Gahan 1900 (Acantholycus - latissimus)

mokanus Pic 1953 (Acantholycus)

moloensis Pic 1925 (Lycus)

montiphilus Kleine 1937 (Acantholycus)

morosus Kleine 1940 (Lopholycus)

multicostatus Pic 1933 (Haplolycus)

murrayi Bourgeois 1880 (Lycus)

natalensis Pic 1933 (Hololycus)

neavei Kleine 1939 (Haplolycus)

nigrolimbatus Pic 1930 (Acantholycus)

nigromarginatus Pic 1930 (Lopholycus)

nitidissimus Pic 1933 (Lopholycus)

nyasanus Kleine 1939 (Haplolycus)

obliquemaculatus Pic 1933 (Haplolycus)

oblongus Pic 1938 (Haplolycus)

obtunsus Kleine 1943 (Lopholycus)

obtusatus Thomson 1858 (Lycus)

obtusus Kleine 1942 (Merolycus)

oliverai Bourgeois 1880 (Lopholycus)

overlaeti Pic 1933 (Lycus)

oviformis Kleine 1939 (Merolycus)

palliatus F. 1775 (Lycus)

pallulatus Dalman 1817 (Lyucs - palliatus)

paradoxus Kleine 1939 (Haplolycus)

parmatus Kleine 1943 (Merolycus)

perpusillus Kleine 1942 (Haplolycus - zonatus)

pici Kleine 1933 (Lycus)

pinguis Kleine 1937 (Merolycus)

plebejus Kleine 1940 (Lopholycus)

podagricus Bourgeois 1902 (Merolycus)

postlimbatus Pic (Lopholycus)

postmaculatus Pic 1937 (Haplolycus)

poultoni Bourgeois 1902 (Chlamydolycus)

praemorsus Dalman 1817 (Acantholycus - latissimus)

praestabilis Bourgeois 1908 (Lopholycus)

proboscideus Fabricius 1781 (Haplolycus)

prodigiosus Bourgeois 1899 (Lycus)

prolongatus Pic 1934 (Haplolycus)

prometheus Bourgeois 1901 (Acantholycus)

pusillus Kleine 1939 (Lopholycus)

pyriformis Murray 1868 (Merolycus - rostratus)

quarrei Pic 1933 (Lopholycus)

raffrayi Bourgeois 1877 (Lopholycus)

reductesignatus Kleine 1939 (Haplolycus)

reili Pic 1933 (Haplolycus)

reticulatus Wulf 1786 (Lycus - palliatus)

revoili Bourgeois 1882 (Lycus)

robustus Pic 1933 (Lopholycus)

roechoudti Pic ? (Acantholycus)

rostratellus Bourgeois 1908 (Merolycus)

rostratus Linnaeus 1967 (Merolycus)

rotschildi Bourgeois 1907 (Hololycus)

rotundicollis Kleine 1939 (Lopholycus)

rufigaster Pic 1933 (Lycus)

rufiventris Pic 1925 (Lycus)

rukomanus Pic 1955 (Lycus)

ruspolii Pic 1924 (Lycus)

sagittifer Kleine 1940 (Lopholycus)

scapularis Murray 1868 (Merolycus)

schoutedeni Kleine 1933 (Lopholycus)

scotti Kleine 1937 (Merolycus)

scrobicollis Fåhraeus 1851 (Haplolycus)

semiamplexus Murray 1868 (Lycus)

semidilatatus Pic 1930 (Lopholycus)

semilateralis Pic 1923 (Acantholycus)

semilimbatus Pic 1953 (Acantholycus)

semilunaris Pic 1936 (Haplolycus)

seminiger Kolbe 1883 (Acantholycus - apicalis)

senegalensis Castelnau 1840 (Lycus - foliaceus)

serenus Kleine 1939 (Lycus)

serratulicornis Kleine 1935 (Haplolycus)

sibutensis Pic 1923 (Lopholycus)

signicollis Kleine 1939 (Haplolycus)

simplex Bourgeois 1889 (Haplolycus)

simulator Kleine 1939 (Merolycus)

singularithorax Pic 1925 (Merolycus)

sinuateapicallis Pic 1936 (Haplolycus)

sinuatus Dalman 1817 (Haplolycus)

sjöstedti Bourgeois 1903 (Lycus)

somalicus Kleine 1939 (Lopholycus)

spinosus Harold 1879 (Merolycus)

staudingeri Bourgeois 1899 (Lopholycus)

stolidus Kleine 1935 (Lycus)

strangulatus Pic 1933 (Acantholycus)

stuhlmanni Kolbe 1897 (Lycus)

subcostatus Pic 1923 (Acantholycus - corniger)

subdilatatus Pic 1921 (Haplolycus)

subgibbulus Pic 1953 (Lycus)

subopacus Pic 1953 (Lycus)

subsinuatus Kleine 1935 ?*

subsinuatus Pic 1942 (Haplolycus)

subspinosus Kleine 1935 (Hololycus)

subsuturalis Pic 1933 (Haplolycus)

subtrabeatus Bourgeois 1880 (Chlamydolycus)

suspectus Kleine 1939 (Haplolycus)

telephorides Pic 1921 (Lycus)

terminatus Dalman 1817 (Acantholycus - corniger)

testaceicolor Pic 1935 (Lopholycus)

theresae Pic 1921 (Lycus)

thomsoni Bourgeois 1880 (Lycus)

togoensis Pic 1952 (Lopholycus)

trabeatus Guérin-Méneville 1835 (Chlamydolycus)

transvaalensis Pic 1933 (Merolycus)

triangularicollis Pic 1933 (Lopholycus)

turneri Kleine 1939 (Lopholycus)

ulkerewensis Kleine 1939 (Lopholycus)

uncinatus Pic ? (Lycus)

unidentatus Pic 1933 (Merolycus)

ustulatus Reiche 1850 (Lycus)

ustus Murray 1868 (Haplolycus)

    vallatus Gerstaecker 1873 (Chlamydolycus - trabeatus)

vittatus Gahan 1909 (Lycus)

vividus Kleine 1939 (Acantholycus)

vrijdaghi Kleine 1940 (Merolycus)

wittei Kleine 1937 (Acantholycus)

    xanthomelas Dalman 1817 (Lycus - foliaceus)

zavattarii Pic 1938 (Lopholycus)

zonatus Fåhraeus 1851 (Lopholycus)

* possible homonyms

----- synonyms

APPENDIX VI ARTICLES

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A phenetic solution to the *Lycus rostratus* species complex problem in southern Africa

by

S. L. CHOWN and K. STAMHUIS*

Department of Entomology, University of Pretoria, Pretoria 0002

Two species, *viz. Lycus rostratus* (L., 1767) and *L. dentipes* Dalman, 1817 are currently recognized in the *L. rostratus* species complex, based on male elytral shape and colour. However, a recent revision of the southern African *Lycus* showed that if these characters are given full weight, at least two other (new) species should be recognized in the complex. A discriminant function analysis of 10 characters (including four elytral traits) from three OTUs of *L. dentipes* and one of *L. rostratus* was capable of discriminating between the four groups, although results obtained from separate analyses of the males and females were inconsistent. However, simple and multiple regression showed that the elytral characters vary allometrically with body size in the males, and the slopes of the lines did not differ between OTUs. This finding suggested that variation in the male elytral characters has a predominantly non-genetic component. A second discriminant function analysis, excluding the elytral characters gave results that were consistent between the sexes and which indicated that a single species, which shows a cline in morphology from the south-western Cape to Namibia, is present. On these grounds, and because of the similarity of the male genitalia, *L. dentipes* is synonymized with *L. rostratus*.

INTRODUCTION

The genus *Lycus* F., 1787 is widespread throughout Africa and comprises some 300 species in 7 subgenera. Decisions on species validity in *Lycus* have traditionally been made using the male genitalia, and the form and colour of the elytra of males, and sometimes females (Bourgeois 1880, 1901; Pic 1930, 1936, 1939). During a revision of the southern African species by one of us (KS), it became clear, however, that the elytral characters are highly variable and may not be useful for sound taxonomic decisions concerning the validity of closely related species in the genus. This was particularly evident in the *L. rostratus* (L., 1767) species complex, which posed an apparently insoluble problem using the traditional characters and conventional taxonomic methods.

Previous authors (Bourgeois 1901; Gomes-Alves 1967; Kleine 1933) recognized two species in the *Lycus rostratus* species complex, *viz.* the nominal species and *L. dentipes*

*Authors in alphabetical order.

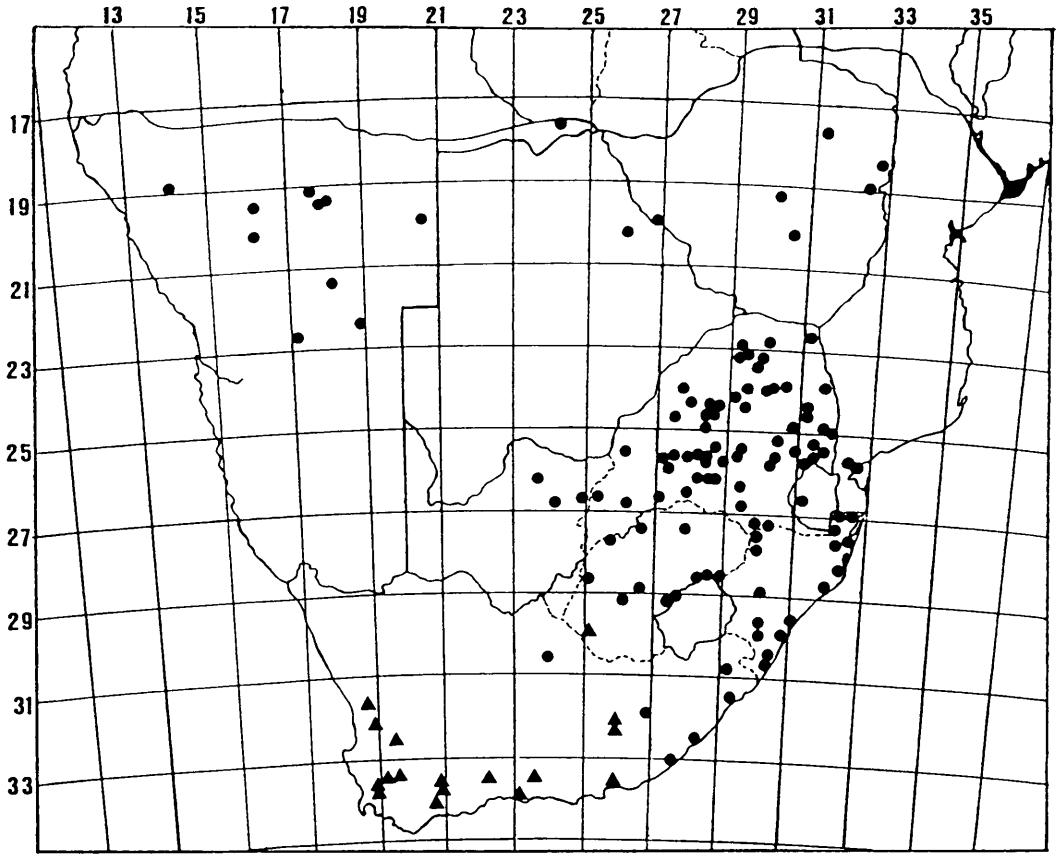


Fig. 1. Distribution of *L. rostratus* Dalman (triangles) and *L. dentipes* (L.) (circles) in southern Africa.

Dalman, 1817. Examination of the southern African material (see Fig. 1. for distribution of these species) suggested that if the elytral characters used for discriminating between these two species are given full weight, at least two additional (new) species should be recognized. These include specimens of *L. dentipes* from Natal, showing extreme distortion of the humeral area (Fig. 2f, h, j), and Namibian specimens of *L. dentipes* quite distinct from the Transvaal/Orange Free State specimens. However, variation in the form of the elytra within, and between, these areas is extensive (Fig. 2a–j) and the taxa all possess virtually identical male genitalia (Fig. 2k–l), making cut-off points between these proposed taxa rather arbitrary. This subjective assessment was supported by a preliminary factor analysis of male specimens, using the elytral characters listed below (see Methods). A plot of the first two factors (Fig. 3), which accounted for 100% of the variance in the analysis, showed that the Namibian and Natal specimens of *L. dentipes* are distinct from the Transvaal/Orange Free State specimens, and that the latter and specimens of *L. rostratus* are placed in a single group.

In an attempt to solve these problems, and to examine the utility of elytral characters for making decisions in species complexes within the genus, we approached the problems from a phenetic point of view. A multivariate morphometric analysis (see James & McCulloch 1990; Rohlf 1990 for recent reviews) was undertaken to examine the

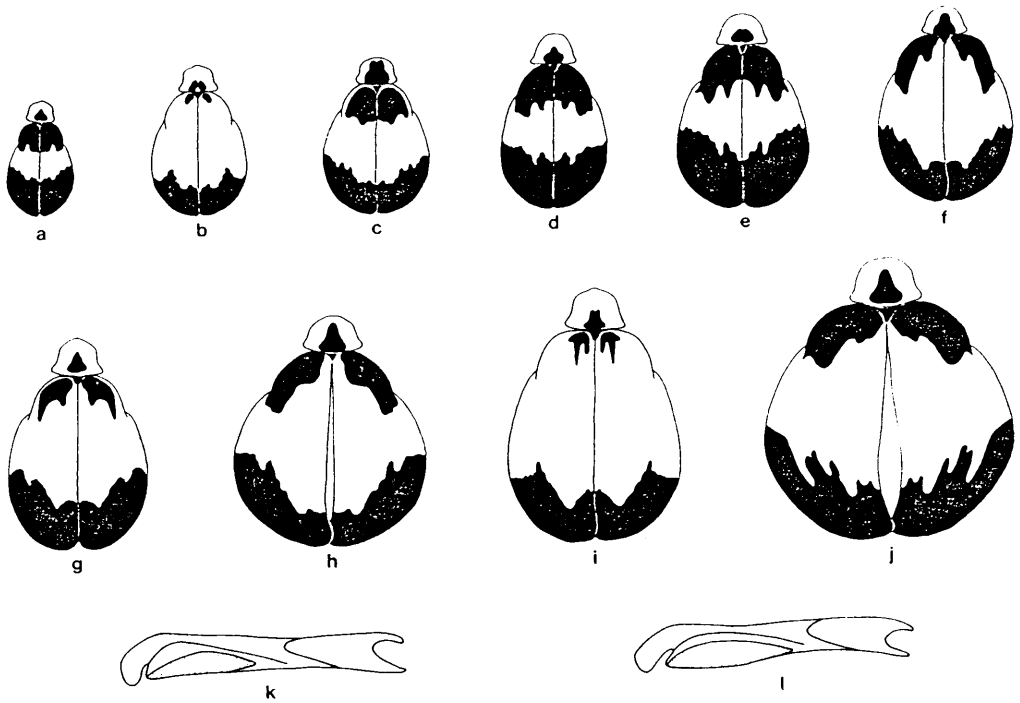


Fig. 2. Variation in size, shape and colour of male's elytra in OTUs of the *L. rostratus* species complex: a, d, e = *L. dentipes* (Namibia); b, g, i = *L. dentipes* (Transvaal/OFS); c = *L. rostratus* (Cape); f, h, j = *L. dentipes* (Natal). Aedeagus of: k–*L. dentipes* and l–*L. rostratus*.

relationship between elytral characters, body size and geographic location, because such analyses have proven to be useful for solving similar problems in other taxa (Gould & Johnston 1972; Harrington 1984). The analysis was done specifically to assist in deciding whether four distinct, parapatric species, or a single, morphologically variable species, should be recognized in the *L. rostratus* species complex.

METHODS

Ten characters (Table 1) on each of a total of 100 specimens representing three OTUs of *L. dentipes* (Natal, Transvaal/Orange Free State and Namibia) and one (southern Cape) OTU of *L. rostratus* were measured using an ocular micrometer on a dissection microscope. These characters were chosen because: 1. they adequately represent the elytral characters used by previous authors working on *Lycus*; 2. on preliminary investigation, they appeared to describe the variation under scrutiny in a 'natural' manner (Rohlf 1990); and 3. because some of them have proven to be useful in distinguishing closely related species in other Coleoptera (Chown 1989; Liebherr 1985). Relationships between elytron breadth, elytron length and humeral height, and the remaining characters, were examined in the males using least squares linear regression and multiple regression. Relationships for these variables were determined for each OTU and compared using the procedure outlined by Sokal & Rohlf (1981: 499). Two

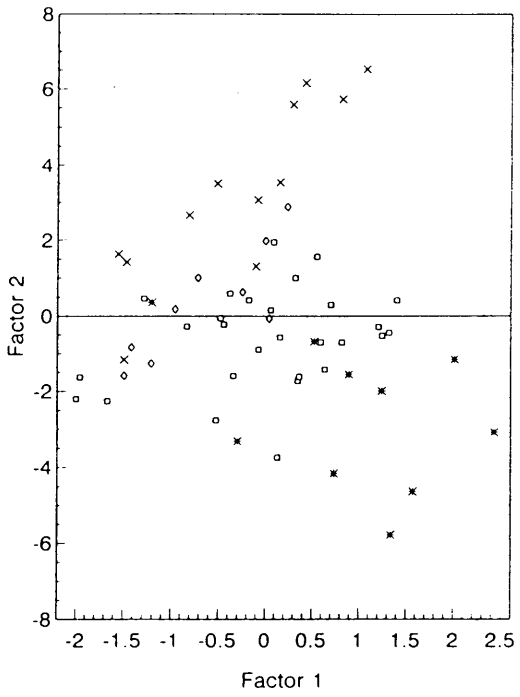


Fig. 3. Plot of the scores of specimens on the two factors obtained from a factor analysis of six characters measured on the male specimens in the *L. rostratus* species complex.

discriminant function analyses (James & McCulloch 1990; Neff & Marcus 1980), using the Statgraphics® algorithm, were performed to determine whether the OTUs could be adequately separated using the characters measured. In the first analysis, males and females were examined separately using all 10 characters. The same procedure was followed in the second analysis, although the elytral characters were omitted. Geographical location was obtained from the specimen labels, rounded off to the nearest quarter degree and converted to decimals. The discriminant function scores and grid reference of each specimen were subsequently used in a canonical correlation analysis (see Digby & Kempton 1987 for the reasoning behind this method) to determine whether there is a

TABLE 1. Ten characters measured on specimens of the *L. rostratus* complex.

1. Total body length (ventral, excluding elytra and antennae).
2. Minimum distance between the mesocoxae.
3. Minimum distance between the metacoxae.
4. Maximum thoracic width.
5. Minimum diagonal distance between the right meso- and left metacoxa.
6. Minimum distance between the right meso- and metacoxa.
7. Maximum width of elytron.
8. Maximum width of humeral area.
9. Maximum humeral height.
10. Maximum elytron length.

consistent relationship between morphology and location in the *L. rostratus* species complex.

RESULTS

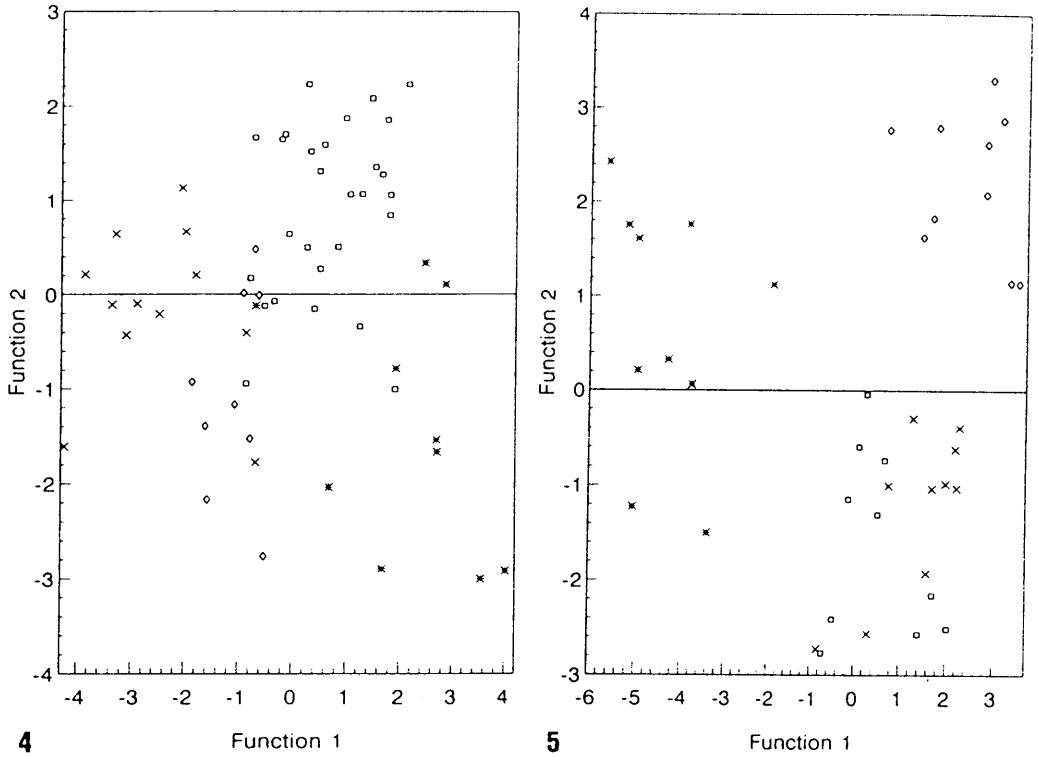
In analyses of both the males and females, function 1 accounted for almost 65 % of the variance in the first discriminant function analysis (Table 2). In both cases the high canonical correlation in function 1 indicated that most of the variation is due to between-group differences. However, the characters important for distinguishing the groups differed slightly (Table 3). The high positive or negative coefficients and low Wilks' lambda showed that in males and females, maximum humeral height is the most important character for discriminating between groups, followed by thoracic, elytron and humeral width in the males, and elytron and humeral width in the females. Although body length and distance between the mesocoxae had low Wilks' lambda in the males, the low coefficients suggested that these characters do not contribute greatly to between-group discrimination. In the analysis of the females, the taxa were clearly

TABLE 2. Performance parameters for the discriminant functions in the analysis of ten traits, including elytral characters.

Sex	Discriminant function	Eigenvalue	% Variance	Canonical correlation
Males	1	2,746	64,32	0,856
	2	1,025	24,01	0,711
	3	0,498	11,66	0,577
Females	1	7,340	68,78	0,938
	2	2,675	25,06	0,853
	3	0,657	06,16	0,630

TABLE 3. Standardized canonical discriminant function coefficients for function 1 and values of Wilks' lambda for the analysis of ten traits, including elytral characters.

CHARACTER	Males		Females	
	Standardized coefficient	Wilks' lambda	Standardized coefficient	Wilks' lambda
Body length	0,220	0,787	0,116	0,885
Mesocoxal distance	0,040	0,799	0,331	0,906
Metacoxal distance	0,288	0,895	−0,160	0,908
Thoracic width	0,953	0,809	1,700	0,846
Meso–metacoxa diagonal	−0,229	0,911	−0,323	0,783
Meso–metacoxa distance	0,044	0,916	0,900	0,761
Elytron width	−0,078	0,802	−0,628	0,700
Humeral width	−1,237	0,824	−1,330	0,519
Humeral height	2,563	0,571	−1,088	0,342
Elytron length	−2,018	0,869	0,051	0,720



Figs 4 & 5. Plot of the scores of specimens on the first two discriminant functions in: 4. the first analysis of the males, and 5. the first analysis of the females. *L. rostratus* (◊), *L. dentipes* Natal population (*), *L. dentipes* Transvaal/Orange Free State population (□), *L. dentipes* Namibian population (×).

separated when the scores of the specimens on functions 1 and 2 were plotted, but the separation was not distinct in the males (Figs 4 & 5). Furthermore, the Namibian and Transvaal OTUs of *L. dentipes* were grouped together, followed by *L. rostratus* and the Natal OTU of *L. dentipes* in the analysis of the females, whereas the analysis of the males indicated that the Namibian OTU of *L. dentipes* is distinct from the others (including *L. rostratus*), which formed a diffuse group.

There was a highly significant relationship between elytron length and the remaining characters on the elytra in the males in each OTU and these relationships did not differ between OTUs (Table 4), except in the case of elytron width, where *L. rostratus* and *L. dentipes* from Namibia formed one homogeneous group differing from a second including *L. dentipes* from Natal and the Transvaal/OFS. Of the remaining characters, thoracic width was the best predictor of elytron length (multiple regression t-value = 2,634, P = 0,03), and likewise no between-population differences could be detected (Table 5), despite the large standard errors which reflect small sample sizes.

In the second analysis, using the first six traits, function 1 likewise accounted for most of the variance (Table 6), although the canonical correlation was substantially reduced in the case of the males, indicating that much of the separation was due to within-group differences. This is also shown by the absence of characters which

TABLE 4. Statistics for simple regressions of elytral characters on elytron length and comparison of regression lines between OTUs (2 = Natal, 3 = Tvl./OFS, 4 = Namibia).

Character	OTU	Intercept±SE	Slope±SE	R-Squared	SE of Estimate
Elytron	*L. rostratus*	0,532±0,27	1,12±0,11	92,75	0,05
width	*L. dentipes* 2	0,205±0,19	1,53±0,07	98,35	0,03
	L. dentipes 3	0,233±0,17	1,49±0,07	94,97	0,07
	L. dentipes 4	0,347±0,11	1,31±0,04	98,95	0,04
				$F_{(3, 53)}$ = 3,16, 0,05> P > 0,01	
Humeral	*L. rostratus*	0,347±0,22	1,13±0,10	94,98	0,05
width	*L. dentipes* 2	0,230±0,19	1,31±0,08	91,97	0,08
	L. dentipes 3	0,269±0,34	1,26±0,13	92,27	0,07
	L. dentipes 4	0,331±0,13	1,15±0,05	98,12	0,04
				$F_{(3, 53)}$ = 1,03, P > 0,25	
Humeral	*L. rostratus*	0,101±0,28	1,07±0,11	91,60	0,06
height	*L. dentipes* 2	0,019±0,61	1,71±0,23	87,46	0,12
	L. dentipes 3	0,048±0,21	1,42±0,08	91,83	0,09
	L. dentipes 4	0,059±0,41	1,21±0,16	84,90	0,12
				$F_{(3, 53)}$= 2,68, P > 0,05	

TABLE 5. Statistics for simple regressions of elytron length on thoracic width and comparison of regression lines between OTUs.

OTU	Intercept±SE	Slope±SE	R-Squared	SE of Estimate
L. rostratus	2,162±1,17	2,46±0,30	89,21	0,68
L. dentipes Natal	−1,634±2,51	3,21±0,50	83,85	1,02
L. dentipes Tvl./OFS	1,787±0,76	2,30±0,16	88,76	0,76
L. dentipes Namibia	0,265±1,10	2,98±0,26	92,91	0,72
			$F_{(3, 53)}$ = 2,60, P > 0,05	

TABLE 6. Performance parameters for the discriminant functions in the analysis using six traits, excluding elytral characters.

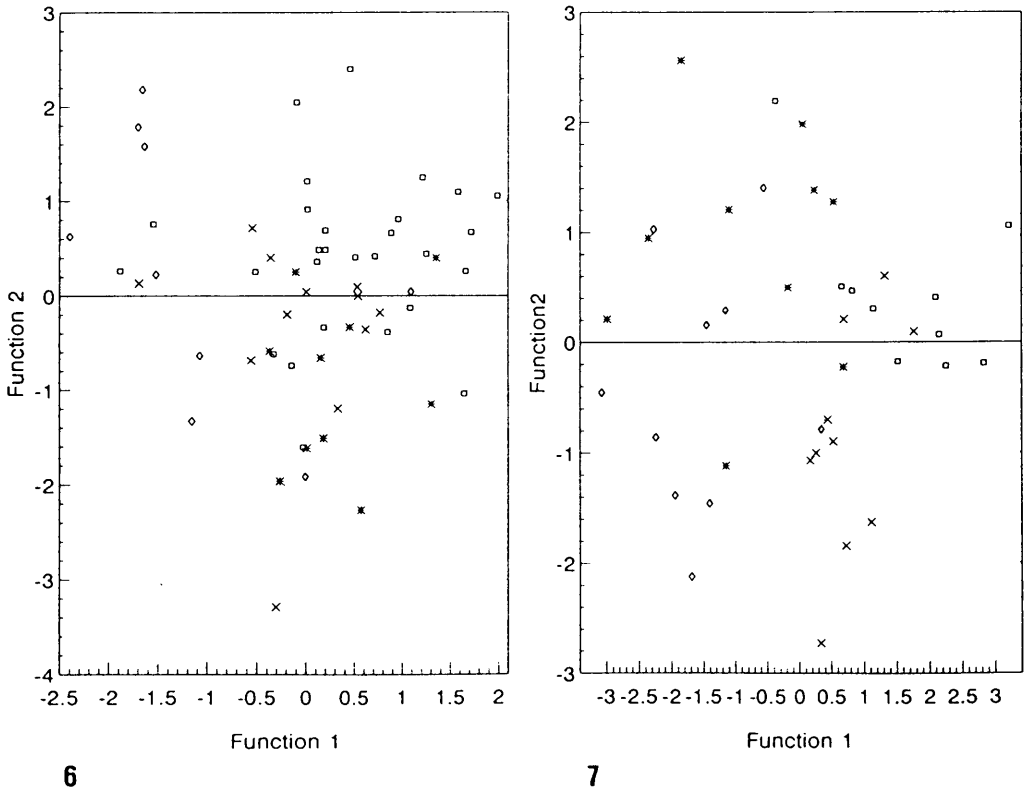
Sex	Discriminant function	Eigenvalue	% Variance	Canonical correlation
Males	1	0,545	58,54	0,594
	2	0,288	30,96	0,473
	3	0,097	10,50	0,298
Females	1	1,736	70,44	0,797
	2	0,537	21,78	0,591
	3	0,192	07,78	0,401

adequately discriminate between groups (Table 7). High standardized coefficients and low Wilks' lambda indicated that in the analysis of the females, the meso-metacoxa diagonal and the meso-metacoxal distance are the most important characters for discrimination between groups. In contrast to the first analysis, where elytral characters were included, the populations could not be clearly distinguished in the analysis of the males, although the analysis of the females revealed a grouping similar to, but less

TABLE 7. Standardized canonical discriminant function coefficients for function 1 and values of Wilks' lambda for the analysis of six traits, excluding elytral characters.

CHARACTER	Males		Females	
	Standardized coefficient	Wilks' lambda	Standardized coefficient	Wilks' lambda
Body length	0,505	0,787	0,228	0,885
Mesocoxal distance	0,017	0,799	−0,016	0,906
Metacoxal distance	0,403	0,895	1,742	0,908
Thoracic width	0,987	0,809	−0,172	0,846
Meso–metacoxa diagonal	−0,018	0,911	−2,095	0,783
Meso–metacoxa distance	−1,308	0,916	0,236	0,761

distinct than, the first analyses (Figs 6 & 7). The canonical correlation analyses revealed a significant relationship, in both variates, between morphology and location (Table 8). The relationship between latitude and morphology is shown for the males and females in Figs 8 & 9, respectively. A cline in morphology, similar in both sexes, can readily be



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Figs 6 & 7. Plot of the scores of specimens on the first two discriminant functions in: 6. the second analysis of the males, and 7. the second analysis of the females. *L. rostratus* (◊), *L. dentipes* Natal population (*), *L. dentipes* Transvaal/Orange Free State population (□), *L. dentipes* Namibian population (×).

TABLE 8. Canonical correlation analysis of morphology and location of the males and females in the *L. rostratus* species complex.

Vector	Canonical correlation	Chi-square	d.f.	P
Males				
I	0,494	22,9	6	0,0008
II	0,359	7,6	2	0,0224
Females				
I	0,629	29,4	6	0,0001
II	0,517	11,2	2	0,0037

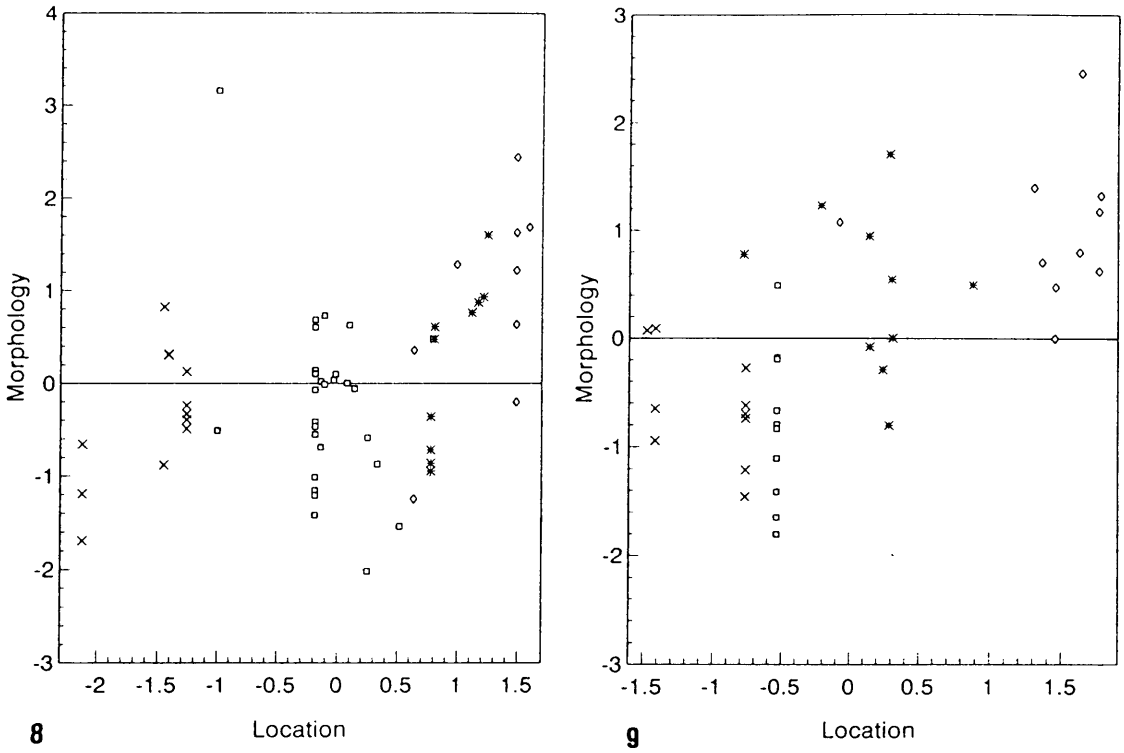
Coefficients for morphological and geographical variables

Males	I	II
Discriminant function 1	−0,602	−0,862
Discriminant function 2	−0,478	−0,016
Discriminant function 3	−0,468	0,912
Latitude	0,562	0,856
Longitude	−0,956	0,366
Females		
Discriminant function 1	−0,947	0,119
Discriminant function 2	0,118	0,993
Discriminant function 3	0,298	−0,015
Latitude	1,032	−0,004
Longitude	−0,251	1,009

discerned, with decreasing scores from *L. rostratus* in the Cape through *L. dentipes* in Natal and the Transvaal/OFS, to the Namibian OTU of *L. dentipes*.

DISCUSSION

The first discriminant function analysis showed that although the various OTUs of *L. dentipes* could be distinguished from each other and from *L. rostratus*, there are distinct differences in relationship between the sexes. Presuming that the quantitative, non-elytral characters show polygenic inheritance (see Falconer 1981 for defence of this reasoning), there seems to be no obvious reason why males and females from the various populations should be grouped differently. Much of the between-group discriminatory ability of function 1 in the analysis of the males was due to humeral height and thoracic width, as well as elytron and humeral width, and elytron length. The regression analyses showed that the size and shape of the elytra are directly related to adult body (thoracic) size which, as with many insects (see e.g. Andersen & Nilssen 1983; Johnson 1982; Juliano 1985), probably has a large non-genetic component, primarily influenced by larval nutrition. The bivariate analyses also demonstrated that such variation is similar (i.e. indistinguishable regression lines) among each of the four OTUs. Predominantly non-genetic differences therefore appear to have been responsible for the separation of the males in the first analysis. This finding strongly suggested that for



Figs 8 & 9. Plot of the scores of specimens on the canonical variables showing the relationship between latitude (second set) and morphology (first set) in: 8. males, and 9. females *L. rostratus* (◊), *L. dentipes* Natal population (*), *L. dentipes* Transvaal/Orange Free State population (□), *L. dentipes* Namibian population (×).

superior resolution of the taxonomic problem the elytral characters should be excluded from the analyses.

The subsequent discriminant function analysis of the males and females revealed a distinct overlap in *L. rostratus* and the *L. dentipes* OTUs, and among-OTU changes in morphology consistent between the sexes. In addition, it is noteworthy that although omission of the elytral characters in the restricted analysis of female morphology led to an increase in overlap in the taxa, there was not a large decrease in the ability of functions 1 and 2 to discriminate among groups. In the restricted analysis of both the males and females, the canonical correlation analyses revealed a cline (*sensu* Endler 1977) in morphology from *L. rostratus* in the southern Cape to the Namibian OTU of *L. dentipes*, with overlap between all four OTUs. This suggests that a single species is present.

On these grounds, and the similarity of the aedeagi of *L. rostratus* and all OTUs of *L. dentipes*, we synonymize *L. dentipes* Dalman, 1817: 27 with *L. rostratus* (L., 1767: 646). However, we caution that this decision was based solely on statistical evidence obtained from an examination of museum specimens. The morphological traits provide provisional markers of the boundaries of gene pools, but additional biological evidence may reveal a complex of sibling species. Furthermore, our results indicated that elytral characters of females may be more useful for taxonomic decisions than those of the males, and we suggest that future workers should thoroughly investigate elytral

characters, from a phenetic point of view, before making taxonomic decisions concerning morphological species complexes in *Lycus*. Mayr (1969) pointed out that characters which show marked allometric variation should be treated with caution, and this is especially the case when the variation appears to be sex-related and its precise cause and function unknown.

ACKNOWLEDGEMENTS

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Comparison of the morphology of the rostrate head and mouthparts of Lycus Fabricius with those of the non-rostrate Calopteron Guerin-Meneville (Coleoptera : Lycidae).

Kitty Wanda Stamhuis & William Murray De Villiers

Stamhuis, K.W., & De Villiers, W.M., [Dept. Entomol., Univ. Pretoria, Pretoria 0002; Rep. South Africa]: **Comparison of the morphology of the rostrate head and mouthparts of Lycus Fabricius with those of the non-rostrate Calopteron Guérin-Méneville (Coleoptera : Lycidae).**

The highly specialized rostrate head, tentorium, mouthparts and canalis alimentarius capitis (feeding canal) of the genus Lycus Fabricius 1787 are described. Internal head anatomy, including the nervous system, facilitated interpretation of the external morphology. The structure of the rostrate Lycus head is compared with the non-rostrate head of Calopteron Guerin-Meneville 1830. Some notes on feeding are also included.

Key words: Lycidae - rostrate and non-rostrate head structure - adult mouthpart structure - terminology.

Stamhuis, K.W., & De Villiers, W.M., [Abt. Entomol., Univ. Pretoria, Pretoria 0002; Rep. Südafrika]: **Morphologischer Vergleich des rostraten Kopfes und der Mundwerkzeuge von Lycus Fabricius mit denen des nicht-rostraten Kopfes von Calopteron Guerin-Meneville (Coleoptera : Lycidae).**

Es folgt eine Beschreibung des hochspezialisierten rostraten Kopfes, des Tentoriums, der Mund-werkzeuge und der Canalis alimentarius capitis (Speiseröhre des Kopfes) in der Gattung Lycus Fabricius 1787. Eine Untersuchung des Innenaufbaus und des Nervensystems erleichterte die Interpretation der äusseren Morphologie. Der Bau des rostraten Kopfes bei Lycus wird mit dem Bau des nicht-rostraten Kopfes bei Calopteron Guerin-Meneville 1830 verglichen. Einige Anmerkungen zur Ernährung werden ebenfalls gegeben.

1 Introduction

About 300 Lycus Fabricius 1787 species have been recorded from Africa [unpublished]. Very little is known about their biology, head and mouthpart morphology, feeding habits and mechanisms.

A peculiarity of the Familia Lycidae is the rostrate head in some of the genera, for example Lycus, Lygistopterus Mulsant. 1838, Lucaina Dugès 1879 and Lygostomus Motschulsky 1861 [Bradley 1930, Arnett 1968].

The rostration of the head seems to be closely related to feeding habits. Controversy exists, however, about the feeding habits of the rostrate and non-rostrate forms. According to Lefroy [1923], Bradley [1930], Comstock [1930] and Arnett [1968] all members of the Familia Lycidae are predators on other insects. Linsley et al. [1961, 1962], on the other hand, reported that the genus Lycus feeds on nectar, e.g. that of Melilotus alba (sweet clover). Crowson [1981] stated that some of the rostrate coleopterous forms, such as the Lycidae "are more or less floricolous, so that the rostrum may aid them to reach more deep-seated nectaries". Forster [1987, 1989] observed Metriorrhynchus Guerin-Meneville 1838 feeding on nectar in flowers of Orchidaceae and Asclepiadaceae. During the course of this study adult Lycus were observed feeding on nectar of plants such as Heteropyxis natalensis (Lavender tree) (Myrtaceae), Ziziphus mucronata (Buffalo thorn) (Rhamnaceae) and others.

The non-rostrate head capsule of Calopteron Guerin-Meneville 1830 was illustrated (without mouthparts or description) by Stickney [1923] who used obsolete terminology for some cranial structures. To date, however, no morphological studies seem to have been done on the rostrate head. In a suprageneric revision of the Familia Lycidae, Bocak & Bokakova [1990] illustrated the rostrate heads of Lycus and Metriorrhynchus, but without descriptions or captions.

This project was undertaken to study the morphology of the

rostrate head and mouthparts of southern African Lycus species, and to compare them with those of the non-rostrate form in Calopteron. The genus Lycus was chosen, firstly, because it is the dominant rostrate group of Lycidae occurring in southern Africa, and secondly, live specimens for dissection and sectioning are easily obtainable.

In the usually heavily sclerotized and rigid cranium of Coleoptera, facial suturae tend to be reduced or lost [DuPorte 1960], making it often difficult, if not impossible, to interpret the external morphological structures. For this reason, the internal structure, musculature and relevant nervous structures of the Lycus head were examined to aid interpretation of the external features.

2 Material and methods

The heads of live male and female specimens of several Lycus species (but mainly of Lycus dentipes Dalman 1817), collected in the Pretoria (25°40'S, 28°08'E) and Brits (25°45'S, 27°56'E) districts, were fixed, dehydrated, embedded in paraffin wax and sectioned using the De Villiers [1969] modification of the Slifer & King [1933] method. The unstained sections were studied under phase contrast and serial sketches were made of the cross sections to obtain a total image of the head interior with its canalis alimentarius capitis (feeding canal), associated muscles and nervous system.

For external examination of the heads, whole mounts of heads and mouthparts were made. Heads were placed in 10% KOH solution at room temperature for 3-4 days to dissolve the internal tissues, after which they were rinsed in distilled water to which a few drops of acetic acid had been added. Dehydration in alcohol (70%-100%), (acid-fuchsin was added to the 95% alcohol for staining), was followed by clearing in xylene and mounting in "Entellan" on microscope slides. Drawings were made with the aid of a dissecting microscope and drawing tube.

Since we were unable to obtain live specimens of Calopteron for sectioning, only whole mounts of heads and mouthparts of dried C. terminale Gorham 1880 specimens were studied.

3 Results and discussion

3.1 General

According to DuPorte [1960] the cranium in Coleoptera always conforms in structure to that of the prognathous head irrespective of the actual orientation. In Lycus the head is prognathous and will be described as such, although it is somewhat deflected. In Calopteron, on the other hand, the head has a distinct hypognathous orientation, the facial area assuming an anterior instead of a dorsal aspect.

3.2 Dorsal and lateral aspects of the head

Lycus (Figs. 1, 2)

The posterior part of the head is bulbous and bears two large, oval, bulging oculi [Oc] antero-laterally. Anteriorly the head is produced in a long slender "beak" or rostrum which bears the mouthparts near its apex. A general characteristic is the complete absence of suturae on the dorsal and lateral aspects, with the exception of the sutura clypeolabralis [Su-cly.lbr] near the apex of the rostrum, which marks the line of union between the clypeus [Cly] and labrum [Lbr]. Two very small rudimentary mandibulae [Md] are attached to the head wall immediately posterior to the lateral ends of the Su-cly.lbr.

A distinct gibber frontalis (frontal bulge) [G-fr] occurs in the cranial wall between the Oc. Crowson [1972] refers to the G-fr as "a raised part of the frons", which is a characteristic feature of Lycidae. The relatively long eleven segmented serrate antennae are inserted close together in two large caveae antennales [Cv-an] on the anterior side of the G-fr. Immediately posterior of the G-fr the head wall is depressed with two foveae frontales

[Fo-fr] situated paramedially in this depressio frontalis [Dep-fr]. The sutura mesocranialis [DuPorte 1960] is absent.

Externally the Cly cannot be distinguished from the frons [Fr] because the sutura frontoclypealis [Su-fr.cly] and foveae tentoriales anteriores [Fo-t.a] are absent. This is a characteristic of all members of the Cantharoidea [Lawrence 1982].

Several criteria are used to distinguish the preoral Cly from the postoral Fr when the Su-fr.cly is absent:

(1) In the lower insects, at least, the Fo-t.a lie in the ventral ends of the suturae frontogenales [Su-fr.ge] at their junction with the Su-fr.cly and therefore at the level of the true mouth. Although it is now generally accepted that the Fo-t.a may migrate dorsally or ventrally in higher insects, DuPorte [1957, 1960] claims that they retain their primitive position at the level of the mouth in Coleoptera and Hymenoptera.

(2) The ganglion frontale [Gan-fr] always retains its position at the level of the true mouth [Snodgrass 1947].

(3) The dilatores cibariales [Dil-cib] always originate in the Cly, while the dilatores pharyngeales [Dil-ph] originate in the Fr [Snodgrass 1947]. However, DuPorte [1957] emphasised that muscles may change their points of origin on the skeleton, depending on functional needs. Matsuda [1965] stressed the fact that the point of insertion (instead of origin) of the Dil-cib is as much a reliable landmark as the location of the Gan-fr, "since it lies just anterior to the Gan-fr, which usually demarcates the preoral Cly from the postoral Fr".

According to DuPorte [1957] and Matsuda [1965] the second of these three criteria is the most reliable.

Since both the Su-fr.cly and Fo-t.a are absent in Lycus, only criteria (2) and (3) can be used to locate the borderline between Fr and Cly.

Criterion (2): In Figs. 6 and 8 it is shown that two very short connectivi frontales [Con-fr] connect the lobi tritocerebrales [Lo-tc] of the brain to the Gan-fr, which is situated just antero-ventrally of the lobes and on the same vertical level as the caveae antennales [Cv-an]. This suggests that the antennae are inserted on the extreme anterior border of the Fr and that the Cly extends from the anterior rims of the Cv-an to the sutura clypeolabralis [Su-cly.lbr], thus constituting the dorsal wall of the rostrum. This interpretation is supported by the statement of DuPorte [1960] that the Cv-an are situated very close to or actually against the Su-fr.cly in most species of Coleoptera.

Criterion 3: The Dil-cib (Fig. 7) have retained their primitive position, originating on the Cly and inserted on the dorsal wall of the cibarium [Cib] anterior to the Gan-fr. The Dil-ph (Fig. 7) which are inserted within the loops formed by the connectivi frontales [Con-fr] and posterior to the Gan-fr, originate on the posterior sides of two transverse platelike apodemata, extending inwards from the two foveae frontales [Fo-fr] in the depressio frontales mentioned above. It is proposed that these apodemata are rudiments of the bracchia tentorialia dorsalia [Br-t.d] (Fig. 7) for reasons given below (q.v. TENTORIUM).

Calopteron (Fig. 12, 14)

The dorsal aspect is similar in appearance to the postero-dorsal bulbous part of the head in Lycus, with the exception that a short, incomplete sutura mesocranialis [Su-m.c.] extends posteriorly from between the Cv-an to a point between the Fo-fr. The Fo-fr were erroneously named "pretentorinae" (= foveae tentoriales anteriores) by Stickney [1923], thereby implying either that the Cv-an are situated on the Cly or that the Fo-t.a have migrated to a position posterior to the Cv-an. From the apex of the gibber frontalis [G-fr] the facial region is deflexed at approximately right angles to the dorsum. This differs markedly from the situation in Lycus.

The Cly is approximately triangular and extends ventrally from the ventral rims of the Cv-an. Its lateral borders are demarcated by suturae clypeogenales [Su-cly.ge], extending ventrally from the Cv-an to the articulationes mandibulares anteriores [Ar-md.a]. Distally it bears a relatively short, transverse labrum [Lbr], which is attached to it by means of a relatively broad membranous strip, instead of a Su-cly.lbr, which was named "preclypeus" by Stickney [1923]. This membranous "hinge" allows the labrum to be very movable. The Cly bears the Ar-md.a at its ventro-lateral margins.

The lateral walls of the cranium are bordered ventrally by a slender sclerite on each side, extending anteriorly from the ventro-lateral margins of the foramen occipitale [For-oc] (Fig. 13) to the ventro-lateral margins of the Cly (Fig. 14). Each sclerite consists of two parts. The posterior part or hypostoma [Hps] (Figs. 13, 14) is relatively straight and bears an articulatio maxillaris [Ar-mx] (Fig.13) at its posterior end and an articulatio mandibularis posterior [Ar-md.p] (Fig. 14) at its anterior end. The anterior part or pleurostoma [Pls] (Fig. 14) is lighter in colour, curved and extends between the Ar-md.p and Ar-md.a. DuPorte [1960] found a similar composite sclerite in the Cassidinae (Chrysomelidae). He proposed the term "parastoma" for the sclerite as a whole.

A condition similar to that described by DuPorte [1960] in Podabrus (Cantharidae), is found in both Lycus and Calopteron, in which the genae [Ge] have grown anteriorly (Lycus) or ventrally (Calopteron) and united with the lateral sides of the Cly, causing the mandibulae [Md] to be of necessity articulated to the head in another position, viz. at the extreme antero-lateral margins (Lycus) or ventro-lateral margins (Calopteron) of the Cly.

3.3 Ventral aspect of the head

Lycus (Fig. 3)

The large, pear-shaped foramen occipitale [For-oc] situated in the postero-ventral head wall, is encircled by a thickened limbus postoccipitalis [L-poc]. Dorsally and laterally the L-poc is completely fused to the headcapsule and the jugum postoccipitale [J-poc] (as well as the sutura postoccipitalis [Su-poc]) is absent in these areas. Ventrally two juga postoccipitalia [J-poc] ("gular ridges" of authors), marked externally by two suturae postoccipitales [Su-poc] (Figs. 2, 3), extend anteriorly for a short distance, ending in the foveae tentoriales posteriores [Fo-t.p] and enclosing a relatively short gula [Gu]. The Gu is an anterior extension of the ventral part of the L-poc and is a similarly thickened part of the cranial wall (Fig. 8). From the Fo-t.p two longitudinal inflections, the inflectiones submentopostgenales [I-smt.pg], extend anteriorly, constituting the lateral borders of the elongated submentum [Smt] (Figs. 2, 3, 9) of the labium. The posterior end of the Smt is completely fused with the anterior end of the Gu. The hypostomata [Hps] (Fig. 2, 3) are attached to the antero-lateral margins of the Smt and extend anteriorly as far as the lateral ends of the Su-cly.lbr. They bear the articulationes maxillares [Ar-mx] at their posterior ends and the articulationes mandibulares posteriores [Ar-md.p] at their extreme anterior ends. The longitudinal areas lateral of and completely fused to the Smt are anterior extensions of the postgenae [Pg] according to the criteria used by DuPorte [1960]. The Smt and Pg constitute the greater part of the ventral wall of the rostrum.

Calopteron (Fig. 13)

Only a vestige of the Gu remains as a narrow, transverse, sclerotized bar, constituting the ventral border of the For-oc, with the Fo-t.p situated at its lateral ends. Stickney [1923] referred to it as a "gular bar". The short, transverse postmentum [Pomt] of the labium is attached to its anterior edge. The

posterior ends of the Hps are fused to the lateral ends of the Gu and extend anteriorly as far as the articulationes mandibulares posteriores [Ar-md.p] (Fig. 14), from which point the pleurostomata [Pls] (subgenae of authors) continue anteriorly. The articulationes maxillares [Ar-mx] are situated at the posterior ends of the Hps, viz. lateral to the base of the Pomt (q.v. Lycus).

3.4 The tentorium

Lycus (Fig. 7)

According to Crowson [1972, 1981] and Lawrence [1982] the tentorium is nearly always membranous in Lycidae, although a rigid tentorial structure was found in other Cantharoidea, such as Chauliognathus pennsylvanicus Degeer (Cantharidae) by Dorsey [1943].

In Lycus no trace of a membranous tentorium could be found. From each fovea tentoriale posterior [Fo-t.p] a brachium tentoriale posterius [Br-t.p] extends dorsad for a short distance, before splitting up in a short anterior branch and an even shorter posterior branch. The musculi depressorales antennales [M-d.an] originate on these branches and are inserted on the ventral basal rims of the scapi antennales [Sc-an]. A pons tentorius ("tentorial bridge" of authors) is absent.

From each fovea frontale [Fo-fr], situated in the depressio frontalis [Dep-fr], a transverse platelike apodema extends inwards, as was mentioned above. The musculi levatorales antennales [M-l.an] originate on the anterior side of these apodemata, with their insertions on the dorsal basal rims of the Sc-an. According to Snodgrass [1935], Matsuda [1965] and Richards & Davies [1977] the antennal levators usually originate on the bracchia tentorialia dorsalia [Br-t.d]. For that reason it is proposed that these apodemata are remnants of the Br-t.d. Stickney [1923] found that the external pits ("supratentorinae"), marking the points of attachment of the dorsal arms to the cranial wall, occur commonly

only in the Staphylinoidea, although "the Br-t.d are surprisingly persistent structures in Coleoptera, considering the large number of genera that possess it in a more or less rudimentary state".

Calopteron (Fig.14)

The tentorium is similar to that of Lycus with the exception that the Br-t.p, extending anteriorly from each Fo-t.p, splits up in a short and thin ventral branch and a longer, broader branch continuing anteriorly for a short distance. The remnants of the Br-t.d were erroneously named "pretentoria" (= bracchia tentorialia anteriora) by Stickney [1923].

3.5 The canalis alimentarius capitis (feeding canal)

Lycus

A tubelike structure, which will be referred to as the canalis alimentarius capitis [Can-al.c], extends from a point immediately posterior to the sutura clypeolabralis [Su-cly.lbr], posteriorly through the head, continuing as the oesophagus [Oes] (Fig. 7) from a point just anterior to the foramen occipitale [For-oc]. Applying criteria (2) and (3) which are used in demarcating the frons and clypeus, it can be deducted that the true mouth opening is situated at the level of, or just anterior of the ganglion frontale [Gan-fr]. Consequently it can be accepted that the part of the tube anterior to the Gan-fr, is the greatly elongated cibarium [Cib] (Fig. 7). This fact is further confirmed by the dilators inserted onto its dorsal wall, which are in fact the dilatores cibariales [Dil-cib] (Figs. 7, 9), according to the criterion of Matsuda [1965], since they are located anterior to the Gan-fr and connectives. The part of the tube posterior to the Gan-fr, is the pharynx [Ph] (Fig. 7) onto which the dilatores pharyngeales [Dil-ph], passing within the loops of the connectivi frontales [Con-fr] (Fig. 6), are inserted.

Further confirmation for this interpretation can be obtained by an examination of the structure and shape of the lumen of the

Can-al.c in cross section. Posterior to the Gan-fr the Can-al.c has a more or less four-sided lumen with narrow dorsal extensions at its dorso-lateral corners (Fig. 8). Its ventral and dorsal walls have a similar degree of sclerotization, whereas its lateral walls appear membranous. Anterior to the Gan-fr the lumen has a distinct crescent shape in cross section (Fig. 9), the walls are sclerotized completely, but the ventral wall is distinctly more sclerotized than the dorsal wall.

3.6 The mouthparts

3.6.1 Labrum and epipharynx

Lycus

The labrum [Lbr], erroneously named "clypeus" by Green [1949], is movably joined to the clypeus [Cly] by a very narrow membranous strip (Fig. 1). It is subquadrate and somewhat transverse. The epipharynx [Eph], located on its ventral side, is membranous and bears an array of short, stiff setae (Figs. 10, 11). The apical margin of the Eph is slightly indented and fringed by setae, the fimbria apicales [Fi-ap] (Fig. 1).

Calopteron

(See "Dorsal and lateral aspects of the head.")

3.6.2 The mandibulae

Lycus

The mandibulae [Md] are very small, slender, smooth and pointed apically (Figs. 1, 2, 3, 4). The lobi molares, as well as articulatory condyli or ginglymi, are absent. The bases of the Md are ventrally in contact with the anterior ends of the hypostomata [Hps] and dorsally with the antero-lateral margins of the Cly. In the specimens examined they are about half as long as the Lbr. They are considered to be non-functional and rudimentary,

with their tips wide apart and pointing anteriorly in the closed position. This agrees with the conclusion drawn by Nel and Scholtz (1990) that the Md of groups that feed on liquids are usually very reduced and simple.

Calopteron

The Md are well developed and distinctly falcate, with the tips somewhat recurving and briefly decussate in the closed position. The lobi molares are absent. Their outer sides are hairy (Figs. 12, 14).

3.6.3 The maxillae [Mx]

Lycus (Fig. 5)

The cardo [Cd] is a slender sclerite which articulates with the posterior end of a Hps. The Cd is not visible in ventral view because it extends ventrally from its dorsal articulation to the head and is attached at right angles to the proximal end of the stipes [St], which extends anteriorly. The St is elongated, with a distinct stipes lateralis [St-l] on its lateral side. The four-segmented palpus maxillaris [P-mx] is attached to the distal end of the St-l. On its dorsal side the St bears a small membranous lacinia [Lc] mesad of the St-l. A larger membranous galea [Gl] is attached to the distal end of the St. The Lc and Gl each bear a dense tuft of long hairs. According to Crowson [1981] "the majority of floricolous beetles rely on hairy apical lobes on the maxillae and labium to mop up nectar on a sort of blotting-paper principle".

Calopteron

The Mx are similar to that of Lycus in all respects, including the dense tufts of long hairs on the Gl and Lc, the only exception being the St which is relatively shorter (Fig. 13).

3.6.4 The labium

Lycus

The labium (Fig. 3) is extremely prolonged as a result of the rostration of the head. Posteriorly the submentum [Smt] is fused to the distal end of a short gula [Gu]. Laterally it is fused with the elongated postgenae [Pg], but its lateral sides are demarcated by two longitudinal inflectiones submentopostgenales [I-smt.pg]. The distal end of the Smt is fused to a short, semi-membranous mentum [Mt] approximately at the level of the posterior ends of the Hps. Distally the Mt is fused to a long and slender praementum [Prmt], bearing a pair of three-segmented palpi labiales [P-lab] latero-distally. A short, densely setose lobe on the anterior tip of the Prmt may be a rudimentary ligula [Lig] fused to the Prmt.

Calopteron

The labium (Fig. 13) consists of two main parts only. A Mt cannot be distinguished and is most probably fused completely with the Smt. For that reason the posterior part is named postmentum [Pomt] (after Snodgrass [1935]). The Pomt is weakly sclerotized, short and transverse. The Prmt is about twice as long as the Pomt, well sclerotized and bears the P-lab at its distal end. The hairy Lig is even more rudimentary than in Lycus.

3.6.5 The hypopharynx

Lycus

The hypopharynx [Hph] (Figs. 7, 11) is fused to the basal half of the Prmt and extends anteriorly as a flat, flaplike structure, with a rounded apex, as far as the anterior tip of the Prmt. Its apical part bears an array of short, stiff setae dorsally, opposing those on the epipharynx [Eph] (Fig. 11).

Two thin tubes [Tu-sal] (Figs. 7, 8, 9, 10) passing through the foramen occipitale, extend anteriorly through the head below the canalis alimentarius capitis and "disappear" (in histological cross sections) approximately at the point where the Hph is fused to the Prmt, viz. the posterior end of the salivarium [Sal] (Fig. 7) or pocket between the ventral wall of the Hph and the opposing surface of the Prmt. According to Crowson [1981] some of the most marked modifications of coleopteran mouthparts are amongst others ".... also perhaps the lack of single or paired salivary ducts opening on the hypopharynx." For want of a better explanation it is assumed that Lycus is an exception to the rule, and that the two tubes are in fact tubi salivarii [Tu-sal], opening to the exterior in the Sal.

4 Feeding mechanism

The rostration (Lycus) and non-rostration (Calopteron) of the head seems to be closely related to feeding specialization.

In Lycus, which was observed feeding on nectar, the rostration seems to be a special adaptation to this type of feeding, the rostrum aiding them to reach deep-seated nectaries. This required the elongation of the clypeus, genae, postgenae and submentum, as well as the cibarium, on the one hand, and the intimate fusion of the clypeus to the genae and the submentum to the postgenae, on the other hand. The dense tufts of long hairs on the galeae, laciniae and ligula confirms the statement by Crowson [1981] that nectar feeding beetles use hairy apical lobes on the maxillae and labium for mopping up nectar. The mandibulae [Md] lost their normal function and for that reason became rudimentary and immobile.

The non-rostrate head of Calopteron seems to be associated with a predatory life style based on its Md which are falcate, with widely separated bases and with the lobi molares absent. A similar situation is found in two other cantharoid Familiae, viz. Lampyridae (q.v. Crowson, 1981) and Drilidae (personal observation). In both these predatory Familiae, however, the two Md are superimposed one above the other in the closed position,

the apex of each reaching to near the base of the other. In Calopteron, on the other hand, the recurved tips of the Md just touch, or cross each other slightly in the closed position. This fact suggests a different way of feeding on prey, as it seems impossible that this type of Md could cut off pieces of the prey for ingestion. Furthermore, if it is taken into account that the galeae and laciniae are provided with hair brushes similar to those of the liquid (nectar) feeding Lycus, it can be deduced that Calopteron is in fact a liquid feeder, the body fluids of the prey in this case. Although it has not been observed, it is proposed that Calopteron uses its Md to slash through the prey's bodywall, after which their recurved tips are used to hold on to the prey while its body fluids are sucked up by the maxillary brushes. This would also explain the highly movable labrum which otherwise might be in the way during this way of feeding. It would also extend the above-mentioned statement by Crowson [1981] about nectar feeding beetles which use hairy apical lobes on the maxillae and labium for mopping up nectar, to include some liquid feeding predatory beetles as well.

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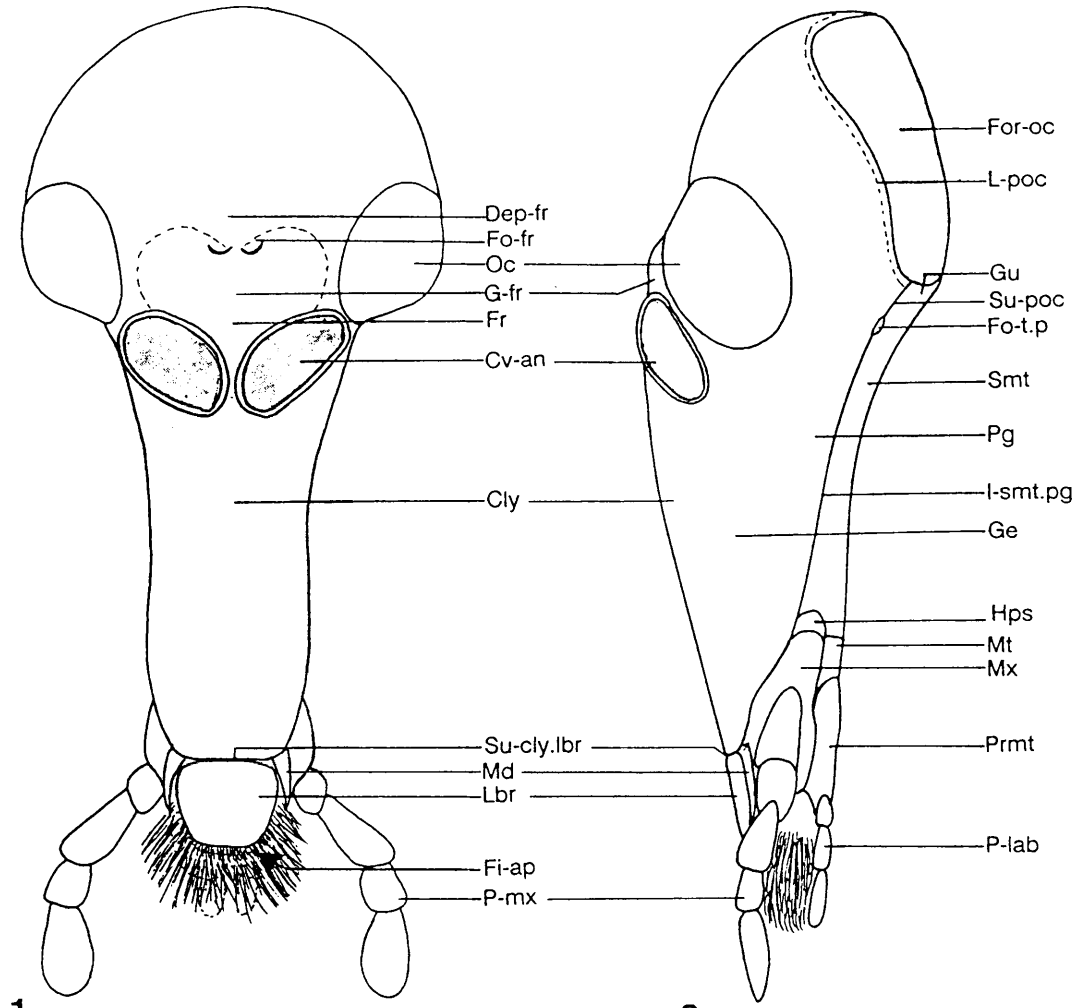
Authors' addresses - Anschriften der Verfasser: Miss Kitty W. Stamhuis & W.M. de Villiers, Department of Entomology, University of Pretoria, Pretoria 0002; Republic of South Africa.



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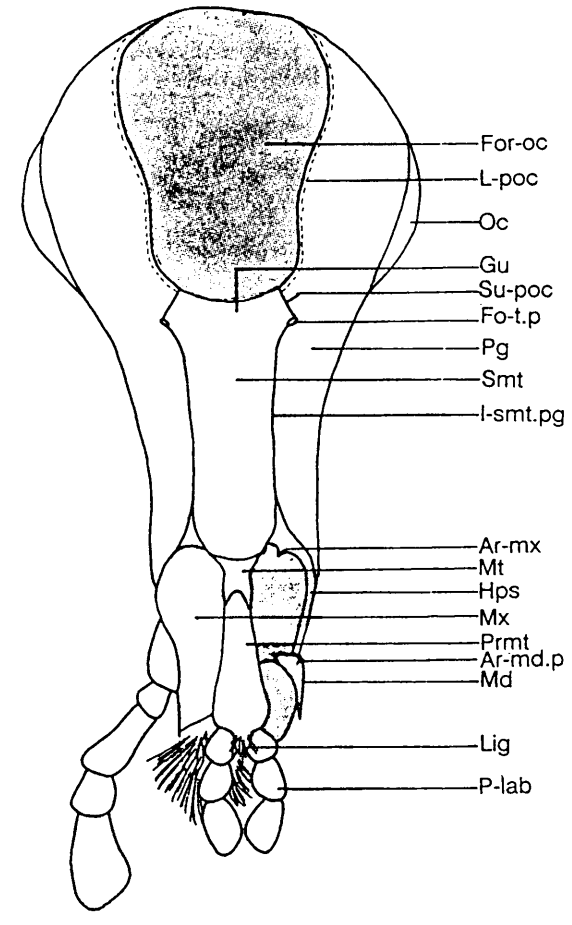

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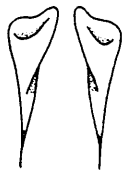

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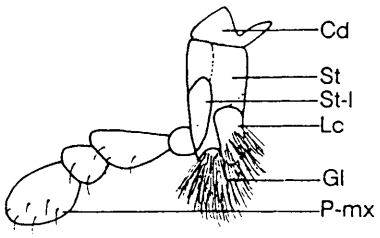

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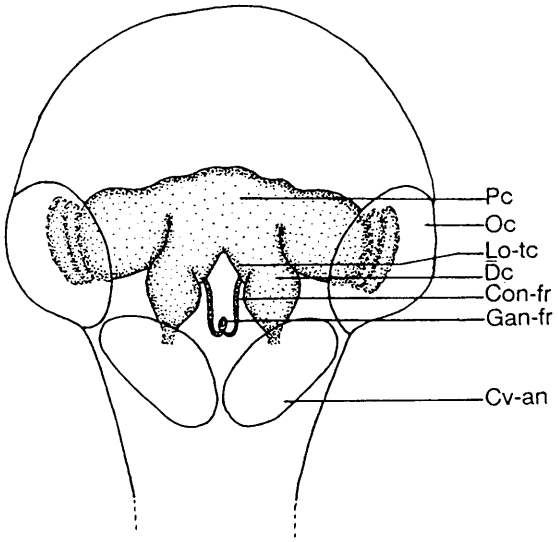

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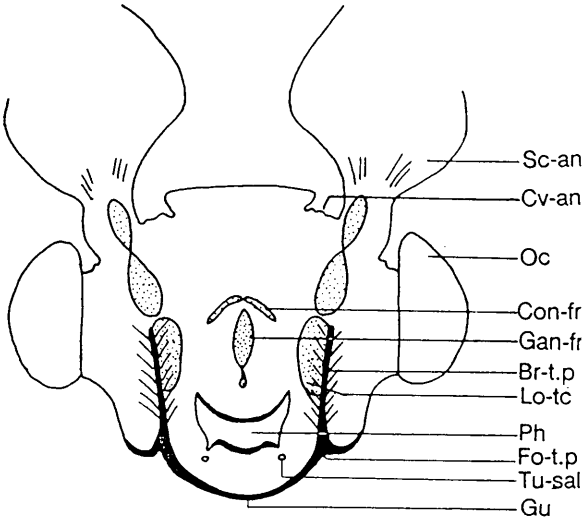

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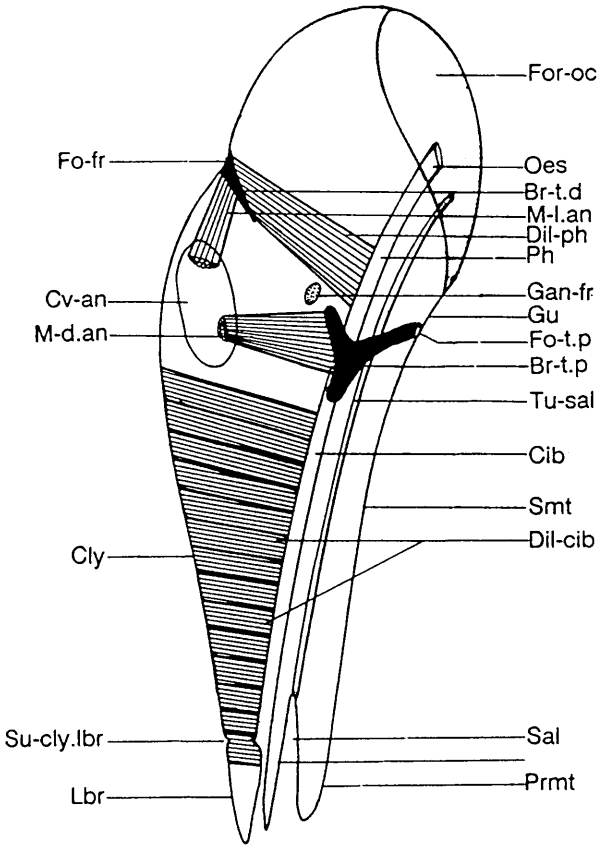

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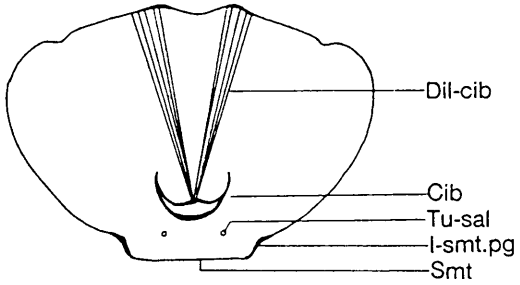

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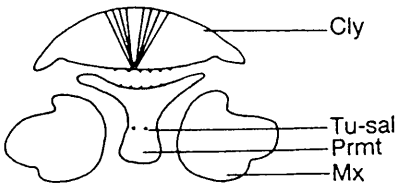

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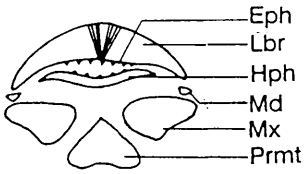

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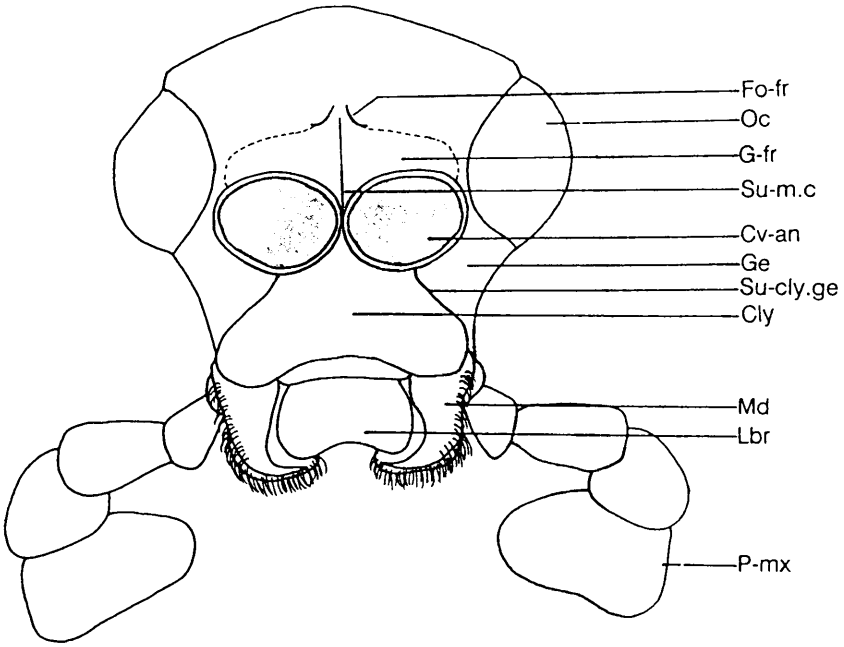

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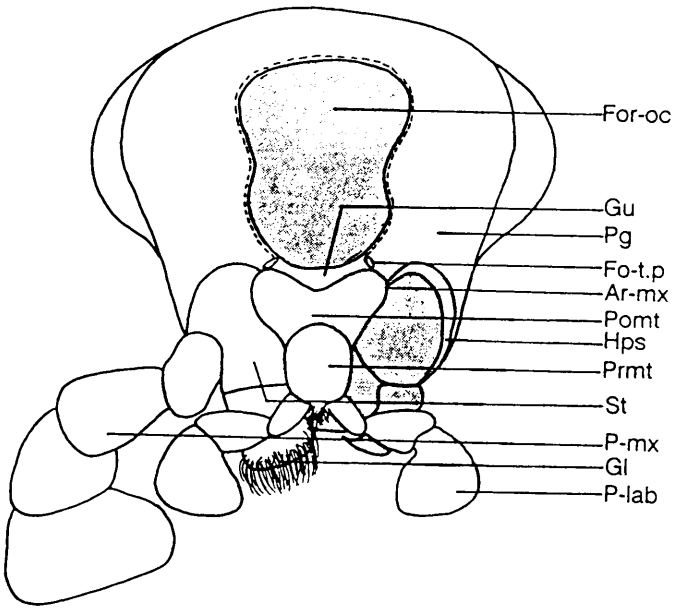

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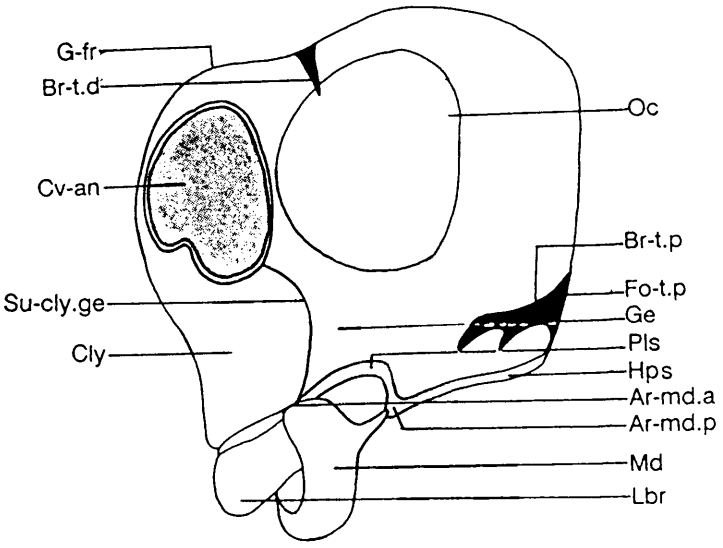

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LEGENDS

Figs. 1-5: A diagramatic representation of the head and mouthparts of Lycus. - 1 Dorsal view. - 2 Lateral view. - 3 Ventral view, with right maxilla and hypopharynx removed. - 4 Mandibulae [Md]. - 5 Maxilla [Mx]. (Scale bar for figs. 1, 2, 3 & 5 = 1 mm; scale bar for fig. 4 = 0,5 mm).

Figs. 6-11: A diagramatic representation of the internal head structures of Lycus. - 6 Posterior part of the head capsule showing the brain, ganglion frontales [Gan-fr], and connectivi frontales [Con-fr]. - 7 Longitudinal section through head, showing the relevant musculature, tentorial structures, canalis alimentarius capitis [Cib, Ph and Oes], tubi salivarii [Tu-sal] and the ganglion frontale [Gan-fr]. - 8 Cross-section through the head at the level of the oculi [Oc] and caveae antennales [Cv-an]. - 9 Cross-section through the posterior part of the rostrum showing the cibarium [Cib] and dilatores cibariales [Dil-cib]. - 10 Cross-section through the anterior part of the rostrum posterior to the hypopharynx. - 11 Cross-section through the anterior part of the rostrum at the level of the labrum [Lbr] (Scale bar for figs. 6 & 7 = 1 mm).

Fig 12-14: A diagramatic representation of the head and mouthparts of Calopteron. - 12 Antero-dorsal view with mandibulae [Md] partially open. - 13 Ventral view, with right maxilla removed. - 14 Lateral view showing the positions of the tentorial structures (Scale bar = 1 mm).

Tab 1: Acronyms of Latin terms used in the text and figures and their English equivalent.

Acronym	Latin	English
Ap	apodemata	apodemes
Ar-md.a	articulatio mandibularis anterior	anterior mandibular articulation
Ar-md.p	articulatio mandibularis posterior	posterior mandibular articulation
Ar-mx	articulatio maxillaris	maxillary articulation
Br-t.d	bracchium tentoriale dorsalis	dorsal tentorial arm
Br-t.p	bracchium tentoriale posterius	posterior tentorial arm
Cv-an	cavea antennalis	antennal socket
Cd	cardo	cardo
Can-al.c	canalis alimentarius capitis	feeding canal
Cib	cibarium	cibarium
Cly	clypeus	clypeus
Con-fr	connectivi frontales	frontal connectives
Dc	deutocerebrum	deutocerebrum
Dep-fr	depressio frontalis	frontal depression
Dil-cib	dilatores cibariales	cibarial dilators
Dil-ph	dilatores pharyngeales	pharyngeal dilators
Eph	epipharynx	epipharynx
Fi-ap	fimbria apicalis	apical fringe
Fo-fr	fovea frontale	frontal pit
Fo-t.a	foveae tentoriales anteriores	anterior tentorial pits
Fo-t.p	fovea tentoriale posterior	posterior tentorial pit
For-oc	foramen occipitale	occipital foramen
Fr	frons	frons
G-fr	gibber frontalis	frontal bulge
Gan-fr	ganglion frontale	frontal ganglion
Ge	gena	gena
Gl	galea	galea
Gu	gula	gula
Hph	hypopharynx	hypopharynx
Hps	hypostoma	hypostoma

I-smt.pg	inflectio submentopostgenalis	submentopostgenal inflection
J-poc	jugum postoccipitale	postoccipital ridge
Lbr	labrum	labrum
Lc	lacinia	lacinia
Lig	ligula	ligula
L-poc	limbus postoccipitalis	postoccipital rim
Lo-ml	lobi molares	molar lobes
Lo-tc	lobus tritocerebralis	tritocerebral lobe
M-d.an	musculi depressorales antennales	antennal depressor muscles
M-l.an	musculi levatorales antennales	antennal levator muscles
Md	mandibula	mandible
Mt	mentum	mentum
Mx	maxilla	maxilla
Oc	oculus	eye
Oes	oesophagus	oesophagus
Pc	protocerebrum	protocerebrum
P-lab	palpus labialis	labial palp
P-mx	palpus maxillaris	maxillary palp
Pg	postgena	postgena
Ph	pharynx	pharynx
Pls	pleurostoma	pleurostoma
Po-t	pons tentorius	tentorial bridge
Pomt	postmentum	postmentum
Prmt	praementum	prementum
Sal	salivarium	salivary pocket
Sc-an	scapi antennales	antennal scapes
Smt	submentum	submentum
St	stipes	stipes
St-l	stipes lateralis	latero-stipes, palpifer
Su-cly.ge	sutura clypeogenalis	clypeogenal suture
Su-cly.lbr	sutura clypeolabralis	clypeolabral suture
Su-fr.cly	sutura frontoclypealis	frontoclypeal suture
Su-fr.ge	sutura frontogenalis	frontogenal suture
Su-m.c	sutura mesocranialis	midcranial suture
Su-poc	sutura postoccipitalis	postoccipital suture
Tu-sal	tubi salivarii	salivary tubes